

JAMAICA.

ANNUAL REPORT

OF THE

DEPARTMENT OF AGRICULTURE

FOR

THE YEAR ENDED 31ST DECEMBER, 1920.

Ordered by His Excellency the Governor to be Printed.



JAMAICA
GOVERNMENT PRINTING OFFICE, KINGSTON.

1921.

DEPARTMENT OF AGRICULTURE.

REPORT FOR THE YEAR ENDED 31st DECEMBER, 1920.

Department of Agriculture, Hope, Kingston P.O.
5th August, 1921.

The Honourable,
The Colonial Secretary,
Sir,

I have the honour to submit, for the information of His Excellency the Governor, the report of the Department of Agriculture for the Calendar year 1920,

1.—GENERAL OBSERVATIONS.

In accordance with the recent instructions from the Secretary of State for the Colonies the period reported on herein has been changed from that of the financial year 1920-1921 to that of the calendar year 1920, thus bringing our Departmental reports in Jamaica into line with the Statistical Reports of the Trade of the Colony which for several years past have been given for the calendar year.

The year 1920 has been to the agriculturists of the Colony one of the most extraordinary years in the history of Jamaica. The average rainfall for the Island was the lowest recorded for the past forty-eight years and yet, so great are the variations in conditions in this Colony, the sugar areas at the Western end of the island suffered from excessive rain to such an extent as seriously to hamper the manufacture of Sugar. Over large areas of the island, however, severe conditions of drought were experienced, causing a lack of food-crops and severe hardship and loss to stock-owners.

The Banana industry, particularly in St. Mary, experienced a severe set-back.

For an agricultural country 1920 may be regarded as having been a very bad year indeed for Jamaica.

Co-incident with this bad fortune for the producers of the Colony, however, arose a condition of unprecedented inflation in the world's markets for all descriptions of tropical produce whereby extreme prices were paid and buyers in their desire to secure tropical produce encouraged the export of goods regardless of their quality.

Although seriously handicapped by the drought, the exports of Jamaica show a record for value in 1920 of over 7 millions sterling due to the high prices at which our produce was sold.

If the year had been one favourable for production the planters of the Colony would have secured returns previously undreamt of. As it was, a year that would otherwise have been one of very low returns stands out as the banner year in the trade of the Colony. Sugar, Rum, Logwood, Cocoa, Coffee, Coconuts, Sugar, Bananas and an array of minor products all sold at high prices and every class of the agricultural community shared in the prosperity.

The inevitable rise in the value^{of} of land resulted from this era of high prices and properties, both great and small, changed hands at very large increases over their former values.

It is, however, a somewhat melancholy task to review this brief era of inflated values from the present standpoint when a depression even more unprecedented than the inflation of 1920 has paralysed the markets of the world and cast a shadow over the industrial life of the Colony.

The Sugar industry suffered somewhat severely from the drought and the exports of Sugar did not exceed 37,000 tons which was a good deal below the original estimate for the crop and less than that exported in the previous year despite a large increase in cultivation and factory capacity.

So great was the world demand for Sugar, however, that even crude sugar produced in open pans by small settlers was called for, and quite an appreciable export of small settlers' produce resulted. The Sugar crop, after providing for the needs of the local consumer, brought in three million pounds, while 7,400 puncheons of rum were exported to the value of £290,000.

The capacity of the factories now in existence, or in process of erection, is sufficient to maintain an export of about 60,000 tons of sugar and, given a market from which fairly remunerative prices for Sugar may be obtained, Jamaica should in the future contribute to this extent to the supplies of sugar for the British Empire.

The recent improvement in the Banana market, due to a certain liveliness in competition among buyers, has checked the transfer of Banana cultivations to Cane and under present conditions the tendency is rather to extend the production of Bananas in Jamaica than to plunge too deeply into Sugar.

The advantage to the Colony of having a fairly large Sugar Industry while developing the trade in Bananas is obvious to every one who has had experience of the two industries in Jamaica.

An excessive reliance on the Banana results in recurrent periods of loss and depression and without a stabilisation of industry by such a staple as the storm-proof sugar cane no reconstructive policy or general scheme of development can be maintained and effectively pushed.

The exports of bananas were over 9 million stems for the year valued at £1,630,000. Fortunately no serious 'blow' took place, and the results, considering the acute drought in St. Mary and St. Catherine, must be regarded as remarkable. 'Panama Disease' shows a regrettable increase in the number of diseased plants recorded. In the important commercial areas, however, the disease is under reasonable control. The chief incidence of the disease has been in the gardens of small settlers in the interior where bananas are grown for food and not for export. In one case of 600 banana plants growing in an upland district in the gardens of a number of small settlers over half were found to be diseased. Such a case shows the importance of early notification and treatment of this disease if it is to be controlled before extensive damage is done.

It is now clear that one of the chief ways in which this disease is spread is the use of the *Banana Trash*, which accumulates at buying centres, for mulching healthy fields. Posters warning the public of this danger have been set up at all the chief centres.

Owing to the short crop there was a lack of fruit for the manufacture of Evaporated Bananas and the exports were less than 8,000 boxes as against 20,000 boxes for 1919. The technical difficulties of this product have been successfully surmounted by the manufacturers and with a supply of suitable fruit the trade should again recover.

The Coconut crop of 1920 showed an increase in exports of four million nuts over that for 1919.

Copra stood steady at 700 tons. The value of the exports of Coconuts and Copra was £356,000 as against £300,000 for the previous year. The health of the trees has remained good in the main Coconut area.

Trees growing in unfavourable situations suffered from drought in some districts, while in Westmoreland, where the Coconut is not generally happy and therefore not of commercial importance, trees continue to suffer from disease. Speaking generally, the commercial areas in coconuts in Jamaica are remarkably healthy and free from dangerous diseases at the present time. The planters have carried out drastic measures wherever a dangerous case of disease has occurred in their plantations with the result that the coconut trees in Jamaica have never been so free from 'Bud-rot' as at the present time.

During the year two special varieties of coconuts were introduced from Fiji through the assistance of the Government of that Colony. The *Nuilika* variety is stated to produce a short tree that comes into bearing in five years and crops heavily, while the *Nuidama* variety is recommended as a precocious and prolific bearer of round nuts with an exceptionally thin husk and is considered in Fiji to be of remarkable hardiness. Efforts are now being made to get seed-nuts of these coconuts from Fiji in larger quantity in order to meet the demands from planters.

The Logwood industry had a year of great prosperity with an export of the value of £700,000. At the present time, however, logwood is almost unmerchantable and the local factories have almost ceased to work. The unfortunate state of things is not due, as has been commonly supposed, to the competition of German dyes, but is due to the paralysis of trade and the cessation of manufacture of woollen and leather goods for which logwood dyes are largely used. It is some comfort to the owners of logwood properties that although the trade is for the moment paralysed the trees are still growing and that when the markets revive the material will be available as required.

Orange Oil fetched very high prices and brought in a revenue of £90,000 or about twice that received for the fruit.

The Citrus industry of Jamaica has never recovered from the closing of the American market and very few planters who have invested money in Citrus plantations during the past 30 years have received adequate returns from their capital investment. A new era is now opening for this industry as a result of the Canadian Reciprocity Treaty which it is hoped will afford a protective encouragement for our citrus fruits in the Dominion of Canada. If a reliable market can be obtained for citrus fruits from Jamaica at all seasons of the year this industry will naturally revive.

The Orange is at best a short-lived tree and many thousands of wild trees have died out during the past ten years owing to neglect and to unfavourable seasons. An inducement is now offered for the resuscitation of the Orange industry and if the fruits hitherto used for producing oil are diverted to the Canadian market a not inconsiderable export of Oranges can be relied on. The various pests of the

orange including the Citrus Black Fly require care and study. Natural enemies, in the areas where Citrus trees are really 'at home' have been found quite effective in controlling this latter enemy.

Cacao showed a marked drop in quantity of about 30 per cent. over the previous year. Prices were, however, high, and the value of the exports of cacao is shown at £212,000. The Cacao nurseries in Portland, St. Mary, and Hanover under the management of the Inspectors of Plant Diseases, were highly successful and all the plants were eagerly accepted by the public.

Coffee suffered from the unfavourable season but with about half a crop a return higher than the average in value was received. The high class Blue Mountain Coffee sold for prices in England higher than had ever been experienced by any living planter.

Cotton was under a cloud during the season and the small revival recorded in 1919 failed to restore this staple to the status of a minor industry.

Pimento was in demand but the supply was only about half that exported in 1919. During the year experiments were carried out by the Industrial Chemist in the preparation of oil from Pimento leaves and the manufacture of Eugenol, IsoEugenol and Vanillin therefrom. The basis of the industry depends on the yield of oil which has been found to show considerable variation with the season of the year and the source of the Pimento leaves. Experimental shipments of Pimento Leaf Oil have been sold in London and the United States at 10/ per lb. The state of the market, however, was such that it was not possible to place large forward contracts for oil that would justify the erection of a factory to produce pimento leaf oil on a large scale. The Industrial Chemist has succeeded in making Vanillin from Pimento leaf oil and an organised effort is being made to explore thoroughly the possibilities of the new industry.

Sisal Hemp is now beginning to figure in the list of exports, two small factories now being in active operation. Considerable areas of Sisal have been planted in the May Pen district of Clarendon and at the Government Plantation at Lititz.

The machinery for the latter enterprise has now arrived in the Colony and the manufacture of fibre should start with the new year. The drop in the price of fibre is somewhat discouraging but even at the present low prices there would seem to be a margin for profit where the manufacture is efficiently carried out.

Hides have continued in fair demand and a revenue of £30,000 from goat-skins has been of benefit to the peasantry.

The export of Cigars has again shown an increase and the large sum of £119,000 was credited to Jamaica Cigars in 1920.

The local Cigarette industry has suffered a relapse in favour of the imported Virginian Cigarettes. This has been due in part to the production of inferior local cigarettes that were almost unsmokable. If the manufacturers pay more attention to the maintenance of a high standard of quality the local cigarettes should again make way against the imported article which is so much more costly to the consumer.

The chief event in the Departmental records has been the purchase of "Grove Place," a cattle pen of 3,362 acres, in the parish of Manchester for the purpose of a Public Stud Farm and its equipment with a splendid array of imported sires. This enterprise has become an immediate success and the response of the public has been quite remarkable, all classes of the community having sent cows and mares to the Stud Farm in numbers far exceeding our most sanguine expectations.

Twenty seven head of pedigree cattle were imported by the Department during the year. No loss was incurred during the year but five cows have since been lost from various causes.

A cooperative effort to obtain new blood of Zebu cattle from India resulted in the purchase of 56 bulls of the Hissar Gujerat, Nellore, Mysore and Montgomery breeds and 6 Nellore cows from India. The planters concerned have agreed to pay the cost of the cattle to the Government.

The first shipment of 16 bulls by the S.S. "Sutlej" arrived in December with a loss of 5 bulls due to very bad weather rounding the Cape of Good Hope.

It is hoped that the other cattle will have better fortune in their voyage to Jamaica.

The year 1920 marks the greatest progress ever made in Jamaica by the cattle industry in the importation of fresh blood of the finest breeds of cattle for use in Jamaica for Beef, Milk and Draught.

The establishment of Dipping Tanks has steadily progressed. At the time of writing 51 dipping tanks are registered with the Department which supplies the "Paranaph" and "Arsenite of Soda" and the testing solutions required to keep the tanks up to strength. Every owner of a dipping tank becomes a missionary of tick-eradication and when the compulsory powers under the new law are in force there will be a solid mass of successful experience behind its requirements. But for the high cost of Cement in 1920 the Law would have been put in force on the 1st April, 1921. The Order will require the erection of about 300 dipping tanks or a total of 350 tanks for the use of the larger proprietors. A supply of "Public Dipping Tanks" will then be required at convenient centres to enable smaller lots of cattle to be dealt with on a co-operative basis.

The Grove Place Tank was the first "Public Dipping Tank" erected in the island. Stock are dipped for the public at one penny per head. This small charge will repay the total cost of the tank in less than two years. Small settlers drive their stock 12 to 14 miles to get them dipped at the Grove Place Tank.

The benefit of dipping horsekind has recently been demonstrated. Besides the ticks, the bot eggs and hair-worm (mange) parasites are destroyed by the dipping. No mishap in the dipping of horsekind has yet been recorded at either centre.

A complete small-scale plant for the experimental manufacture of Condensed Milk has been obtained so as to enable the possibilities of this industry to be tested out on a reliable basis at the Government Laboratory.

If the £40,000 per annum at present sent out of the island for tinned milk can be retained in the Colony through the establishment of a co-operative Condensed Milk Factory the advantage to the country will be appreciable.

The Department has during the year suffered severely in loss of staff. The death of Mr. W. Harris, F.L.S., Government Botanist and Assistant Director, is an irreparable loss to the Botany of the Island.

besides being a serious blow to the organisation of the Department due to the difficulty of securing a competent officer to discharge these duties.

The Deputy Island Chemist, Mr. R. Simmons, F.I.C., left in May and while on leave received promotion in another colony. The Microbiologist, Mr. S. F. Ashby, B.Sc., was promoted to be Mycologist to the Imperial Department of Agriculture for the West Indies. No replacement of either of these three technical officers has yet been possible and the work of the Department has therefore suffered a somewhat severe set-back.

II.—PUBLIC GARDENS & NURSERIES.

Report of the Acting Superintendent of Public Gardens.

1. HOPE GARDENS.

Bougainvilleas.—The terra-cotta Bougainvillea on the long Pergola made a magnificent show of colour from January to March and as in previous years attracted much attention from visitors. The "Ruby" Bougainvillea was in flower practically throughout the year and attracted much attention. It makes such a beautiful show at Hope that it advertises itself, the result being that at present we are unable to cope with the demand for young plants.

Rosa Catalina.—This famous plant which was procured last year started to flower in the latter part of this year. The flowers are of a very beautiful deep pink colour and when well established this variety will be a great acquisition to the gardens. Two seedlings were obtained by crossing the terra-cotta with the "Ruby." These are in a juvenile stage and it will be some time before we are in a position to say much about them.

Rosary.—The beds of "Maman Cochet," pink and white, produced large quantities of cut roses for supplying the Public and as quickly as young plants can be produced they are used for replanting beds from which old exhausted bushes are removed.

The selected varieties budded on "multiflora" stock imported last year have not been a success. Thirty-five hundred selected varieties were imported for sale to the general public and of these about six hundred are being planted in beds which have been specially prepared.

In preparing the beds for the new roses the soil was taken out to a depth of two feet and mixed with well-decayed farmyard manure and replaced in the excavations which were filled to a few inches below the surrounding surface.

Hippeastrums.—The Hippeastrums made a very attractive show during the early part of the year. They flowered more freely than in previous years.

Routine Work.—The usual routine work of the garden was carried out in the way of mowing lawns, weeding beds and borders, cleaning roads and walks, replacing and pruning shrubs in the borders, mulching beds and watering and irrigating. General repairs were carried out in the greenhouses.

Nursery.—The nursery work at all times demands and receives special attention. We endeavour to keep as large a stock of the varied assortment of plants as possible to supply the local demands.

PLANTS DISTRIBUTED FROM HOPE GARDENS, APRIL-DEC. 1920.

Sold.

Economic Plants—				
Cocoa	..	..	..	1,521
Citrus	..	..	..	312
Nutmeg	..	..	..	410
Eucalyptus	..	..	..	386
Misc. Fruit & Economic Plants	..	..	..	2,082
				4,717
Ornamental plants	..	..	..	8,533
				13,250

Free Grants.

Economic Plants—				
Cocoa	..	..	..	3,673
Citrus	..	..	..	6,006
Nutmeg	..	..	..	48
Eucalyptus	..	..	..	—
Cane tops & cuttings	..	..	..	200
Misc. Fruit &c. Economic plants	..	..	..	4,777
				14,704
Ornamental plants	..	..	..	3,234
				17,938
Total number of Economic plants	..	..	..	19,421
Total number of Ornamental plants	..	..	..	11,767
Total number of plants distributed	..	..	..	31,188

The following statement shows the distribution of plants for the last three years from the Nursery at Hope:—

	1920 (April-Dec.)	1919-20.	1918-19.
Cocoa	5,194	8,211	14,077
Citrus	6,318	1,126	1,491
Nutmeg	458	420	332
Eucalyptus	386	308	460
Cane tops and cuttings	200	110,089	158,400
Misc. Fruit & Economic plants including Timber Trees	6,865	24,632	7,874
Ornamental plants	11,767	14,920	21,883
	<u>31,188</u>	<u>159,706</u>	<u>204,517</u>

Meteorological.—Hope Gardens, 668 feet altitude. The mean temperature is 76.1 F. and the average annual rainfall is 53.60 inches for 40 years. The mean temperature for 1920 is 78.8 F. and the total rainfall was 26.24 inches as follows:—

1920.	Inches.
January	1.25
February	2.00
March	1.59
April	0.00
May	4.02
June	0.32
July	0.46
August	2.23
September	5.05
October	7.93
November	1.25
December	0.14
Total	<u>26.24</u>

2. CASTLETON GARDENS.

Roses.—The rose beds that were replanted last year have made good growth. The old bushes in two beds were dug out and the beds forked, manured, and replanted and three beds were forked and manured also the borders were forked and replanted.

Coffea Laurentii.—These plants have made good growth and more plants have been planted out.

Lily Tank.—The water Lily Tank was thoroughly cleaned and a special mound was made for the *Victoria regia* in the centre. A compost made of horse droppings and a small portion of soil was used. The plant bloomed continuously for several months.

Mangosteen.—The Mangosteen trees have borne a heavy crop of fruit. The young plants of this fruit tree planted out on the western slope near the Palmetum are making good growth.

Plant Shed.—The plant shed has had to be repaired again this year.

Routine Work.—The usual routine work of forking, weeding beds, billing lawns and slopes, pruning shrubs and propagating and potting plants was regularly attended to. The walks were badly damaged during the heavy rains in January and extra repairs had to be done.

Visitors.—The Castleton Garden is a favourite resort for tourists and residents. During the visit of the President-Elect of America to this Island he and his party visited the Gardens when the Director of Agriculture presented souvenirs of botanical interest on behalf of His Excellency the Governor and Lady Probyn to the President-Elect and Mrs. Harding.

PLANTS DISTRIBUTED FROM CASTLETON GARDENS.

	Sold.
Economic plants	71
Ornamental plants	1,750
	<u>821</u>
	Free Grants.
Cocoa plants	4,875
Ornamental plants	360
	<u>5,235</u>

Transferred to Hope Nursery.

Economic plants	..	..	3,466
Ornamental plants	..	..	9,759
			13,225
Total number of Economic plants	..		8,412
Total number of Ornamental plants	..		10,869
Total number of plants distributed	..		19,281

Meteorological.—Castleton Gardens, 496 feet altitude. The mean temperature is 75.5 F. and the average annual rainfall is 117.75 inches for 47 years. The mean temperature for 1920 was 79.9 F. and the total rainfall was 88.07 inches as follows:—

1920.	Inches.
January	3.84
February	5.72
March	8.30
April	0.24
May	9.69
June	10.86
July	2.73
August	6.75
September	16.35
October	14.08
November	6.40
December	3.11
	88.07

3. PUBLIC GARDENS, KINGSTON.

Victoria Park.—The Cannas have made a constant display of bloom this year and were greatly admired by the general public and fresh sites are being prepared for them.

Lily Tank.—The lily tank was cleaned out and fresh compost was added and planted with white and pink Nymphaeas.

Lawns.—Several small lawns and plots which were killed out by the drought have been replanted and are in a fairly satisfactory condition.

Routine Works.—The usual routine work of pruning, forking, weeding, watering and manuring beds and borders was regularly attended to.

Walks.—The main walk leading through the garden which was in very bad condition, was first dug up and then a layer of coarse gravel was put on and a covering of marl was placed on top of this and then thoroughly watered and rolled.

Street Trees and Gardens.—The general pruning of the shade trees along the sides of the streets has been regularly attended to and kept within bounds. The small gardens near the Public Buildings were kept in good order throughout the year.

Weather.—The rainfall at this garden for the year was 21.56 inches below the average for 42 years and the plants in the borders and in various parts of the garden suffered considerably although regularly watered during the dry period.

Meteorological.—Victoria Park, 60 feet altitude. The mean temperature for 30 years is 78.1 F. and the average annual rainfall for 42 years is 30.67 inches. The mean temperature for 1920 was 79.3 F. and the total rainfall was 9.11 inches as follows:—

1920.	Inches.
January	0.07
February	1.26
March	0.34
April	—
May	3.46
June	—
July	0.53
August	0.99
September	0.84
October	1.23
November	0.37
December	0.02
	9.11

4. HILL GARDENS, CHINCHONA.

Beds and Borders.—All the beds and borders were regularly weeded and forked when necessary and kept in a tidy condition.

Flowering Plants and Shrubs.—The collection of flowering plants in the garden at Cinchona is very interesting to visitors and whenever it is possible to do so additions are made of plants which are likely to thrive at an altitude of 5,000 ft.

Students.—Dr. McLean Thompson of Glasgow University was in residence for three weeks during the year and made a collecting tour in the Blue Mountains.

Meteorological.—Hill Gardens, 4,900 feet altitude. The mean temperature is 62.5 F. and the average annual rainfall is 99.62 inches for 50 years.

The mean temperature for 1920 was 64.3 F. and the total rainfall was 41.17 inches as follows:—

	1920.	Inches.
January		1.77
February		2.99
March		4.22
April		0.23
May		7.11
June		1.29
July		0.64
August		0.81
September		3.18
October		13.53
November		4.00
December		1.40
		41.17

5. KING'S HOUSE GARDENS AND GROUNDS.

Rosary.—The rosary which was remodelled and planted with Maman Cochet is now well established and a profusion of bloom is always to be seen. Several new varieties of roses have been planted out in the vacant spaces in the beds.

Lawns.—The lawns were regularly mown and kept in good order. Several old trees were removed from the lawns making a decided improvement to the general appearance.

Borders and Beds.—All the borders and beds were regularly forked and cleaned and the shrubs pruned.

Pastures.—The pastures not leased to Mr. Seymour were billed this year and several Ficus trees which were dead were removed from the pastures.

Drive and Walks.—The drive was repaired. The walks were regularly weeded and kept in fairly good condition.

6. SUMMARY OF PLANTS DISTRIBUTED BY THE DEPARTMENT DURING THE LAST THREE YEARS

	April-Dec. 1920.	1919-20.	1918-19.
Cocoa	10,069	26,610	21,752
Citrus	6,318	1,126	1,491
Nutmeg	458	420	332
Eucalyptus ..	386	308	460
Cane tops & cuttings	200	195,654	195,605
Misc. Fruit & Economic plants including Timber trees	10,402	25,822	10,110
Ornamental Plants ..	22,636	16,486	37,407
	44,489	266,426	267,157

The Garden and Plantation Sales for the past three years have been as follows:—

1920-21	£481 .5 4
1919-20	354 15 3
1918-19	239 0 0

7. BATH GARDEN AND NURSERY (ST. THOMAS).

Mr. H. G. Coote, Inspector of Plant Diseases for the eastern end of the Island and who is in charge of this establishment reports as follows:—

The usual operations of keeping the garden weeded and the paths clean, grass cut, etc., were regularly attended to.

There was a brisk demand for cocoa plants and in spite of the prolonged drought experienced 10,500 seedlings were distributed.

The Garden is a popular local resort and there were a large number of visitors during the year.

A large number of cuttings and plants of an ornamental nature were given away besides a regular supply of flowers.

Meteorological.—Bath Garden, 170 ft. altitude.

8. MONTPELIER EXPERIMENT STATION AND NURSERY (ST. JAMES).

Mr. Stanley Scudamore, Inspector of Plant Diseases for the western section of the Island, is in charge and reports as follows:—

During the year the Nursery has been forked and weeded and kept in good cultivation.

Canes.—Seven plots were grown to test the tonnage as plants and ratoons. The varieties are as follows:—

D.625 Plants and 3rd ratoons.
B. 208 Plants and 3rd ratoons.
J.72 Plants and 1st ratoons.
White Transparent—Plants.

These will be reaped during the following February and March and the results given
Cane tops delivered from the nursery during the year were as follows:—

D.625	..	38,285 tops and cuttings
B.208	..	36,386 “
J.72	..	19,830 “
		94,501

Cocoa.—A large number of seedlings were grown but owing to the prolonged drought there was not much demand for them and only 1,381 were distributed. The remainder died owing to being kept too long in the bamboo pots.

Nursery Sales.—During the year £20 10s. 7½d. was realised for bananas and canes from the Nursery.

9. CASCADE NURSERY (HANOVER).

During the year land was obtained at Cascade and a cocoa nursery laid out. 5,000 cocoa seedlings were raised but none were distributed during the year owing to their not being sufficiently grown.

10. CORNWALL NURSERY (WESTMORELAND).

During the year land was obtained at Cornwall and a cane nursery started.

The following varieties were planted out B. 208, D. 625, and J. 72. As soon as these varieties are sufficiently grown cuttings will be distributed from them.

11. TRANQUILITY AND SPRING GARDEN NURSERIES (PORTLAND).

During the year the above nurseries were laid out under the supervision of Mr. J. B. Sutherland and from the results of the number of plants distributed it will be seen that advantage has been taken of having a nursery in that district.

Mr. Sutherland reports as follows:—

Tranquility Nursery.—The distribution of plants was as follows:—

Cocoa	..	13,000 plants
Coconut	..	2,000 “
China Banana	..	1,500 “
		16,500 “

Spring Garden Nursery.—This nursery was started during the latter part of the year and it is expected that about 20,000 plants will be ready for distribution in the following spring.

12. ALBANY NURSERY (ST. MARY).

During the year a cocoa nursery was established at Albany under the supervision of Mr. J. E. Carpenter, Inspector of Plant Diseases and reports as follows:—

The land was thoroughly cultivated and beds made and seeds sown. It is hoped that about 7,000 plants will be available for distribution during the spring months of the following year.

13. DANKS NURSERY (CLARENDON).

During the year a cane nursery was started at Danks and the following varieties planted: D.625, J.72, D.208, and Bourbon, but owing to the prolonged drought experienced nearly all the plants were destroyed. The nursery has been replanted and the plants are now making good growth. The cultivation was well done and the nursery regularly weeded and kept clean and we look forward to having a good nursery at Danks next year.

W. S. GOODMAN,

Actg. Superintendent of Public Gardens.

III.—AGRICULTURAL EXPERIMENTS.

REPORT BY SUPERINTENDENT OF AGRICULTURE.

Brown's Town P.O., June 15th, 1921.

The Hon. Director of Agriculture.

Sir,

I have the honour to submit my Annual Report on the work of the Superintendent of Field Experiments, for the year ending December 31st, 1920.

This work may briefly be divided under the following heads and sub-heads:—Sugar Cane Work, including experimental work with different varieties of Canes, Manurial Experiments with fertilizers in conjunction with cattle pen manure, ashes and lime. The completion of the survey of the Island to determine the extent of the spread of the Mosaic disease of cane. Inspection and report on productive cane lands in certain parishes, The starting of a Sugar Cane nurseries in St. Thomas, Clarendon, and Westmoreland, with a tonnage test of the varietal canes at present growing at the Montpelier nursery; Inspection of reported Sisal disease in different parts of the Island, Experimental tests in the use of Trypan Blue, for the treatment of anaemic cattle on tick infested properties, and finally the supervision of or advice on, the erection of cattle-dipping tanks in various parts of the Island.

Canes.—The following series of Experimental plots were arranged after consultation with leading planters, who had been using artificial manures for a number of years; and based upon the results of the Department's work in this line since 1910. Mr. M. S. Goodman, Plant Breeder, who was Mr. Bovell's Assistant in Barbados for some time, was also consulted.

Plot 1. No Manure.

2. Nitrate of Soda 2 cwt. per acre.

3. Sulphate of Ammonia 2 cwt. per acre.

4. No manure.

5. Nitrate of Soda 2 cwt. per acre followed by Sulphate of Ammonia 2 cwt. per acre 4 months later.

6. Nitrate of Soda 2 cwt. per acre followed by Nitrate of Soda 2 cwt. per acre 4 months later.

7. No Manure.

8. Sulphate of Ammonia 2 cwt. per acre and Sulphate of Potash 1 cwt. per acre.

9. Nitrate of Soda 2 cwt. per acre and Sulphate of Potash 1 cwt. per acre.

10. No Manure.

11. Sulphate of Ammonia 2 cwt. per acre and Sulphate of Potash 2 cwt. per acre.

12. Sulphate of Potash 2 cwt. per acre.

13. No manure.

14. Cattle pen manure 30 loads per acre.

15. Lime 10 cwt. per acre.

16. No Manure.

17. Ashes 1 quart per root.

It will be noticed that the three kinds of artificial manures, Sulphate of Ammonia, Sulphate of Potash, and Nitrate of Soda which have been found to give results on the cane lands of Jamaica, have been included in this series of plots, both singly and in conjunction with each other in various proportions, as has also been added the ordinary estate manures, cattle pen, lime and ashes. It will also be noticed that beside each manured plot there is a check plot of No Manure, for purposes of comparison.

The Phosphate manures have been omitted as we have found after years of experimental work that they give no increased tonnage to our lands.

A series of 15 sets of these plots were arranged on the following estates in different parts of the Island. St. Catherine: Caymanas, Worthy Park; Clarendon: Bog, Amity Hall; Westmoreland: Blue Castle Friendship, St. James: Catherine Hall, Hampden.

Northern Estates.—Trelawny: (Upper) Long Pond, Vale Royal, Georgia; Trelawny: (Lower) Green Park, Fontabelle; St. Ann: Richmond.

Varietal Canes.—On my resuming the position of Superintendent of Field Experiments in September 1919, my first endeavour was to test the old varieties of cane which we had sent out to planters during the past ten years.

I regret to report that I found that the work had been abandoned by the planters and that there were no separate plots of seedling canes arranged for experimental purposes. available for testing, with the exception of a field of B3922 at Caymanas Estate, which gave over 60 tons per acre as plants, as compared with 35 from the Transparent and 34 as first Ratoons to 22 from the Transparent.

Mr. Fred. Clarke at Worthy Park has laid off several five acre fields in which he is testing out the value of local varieties. The Bourbon, Ribbon, Transparent, and Selangor. Such work is most valuable not only to Worthy Park but to the Island. These tests have not yet been completed, but as soon as possible I will ask Mr. Clarke to give us these data for publication. So far the Bourbon has given over 40 tons per acre as plants, which is slightly in excess of the Ribbon and Transparent. Mr. Clarke however, is of the opinion that the Bourbon will not ratoon as well as either the Ribbon or Transparent.

Uba Cane.—This cane is rapidly assuming an important position in the dry area of Vere and on the north coast. The first recorded tests were made at Hampden and Gales Valley Estates in the Queen of Spains Valley. The Uba canes yielded at Gales Valley as plants 31 tons per acre, as compared with 22 tons from the Estate cane. At Hampden the Uba gave 12 tons to 7 of the estates cane. The yield of juice per ton of cane was the same in both instances, 140 gallons per ton. The low tonnage recorded at Hampden is due entirely to the very severe conditions of drought prevailing during the year. Mr. Kelly Lawson speaks in the highest terms of value of the Uba Cane as a help in the solution of the fuel problem.

At Worthy Park the Uba Cane was not equal to the estate cane, giving only 26 tons per acre as compared with 35 from the estate cane, yielding nearly 20% less juice and that of an inferior quality.

In Vere, Amity Hall is extending its cultivation to 100 acres. Morelands is also putting in a large field. On the Northside, the Northern estates are planting Uba extensively. The area under cultivation of this cane will probably reach 100 acres.

It is undoubtedly true that as a stand-by in poor years the Uba cane though not as convenient a cane to reap on account of the large numbers of small canes per stool and its clinging trash will be a great help towards making up the tonnage in dry districts.

I have arranged varietal tests of the native canes and such seedlings as may be found growing in the fields on the following places: Bogue, Bybrook Central, Catherine Hall, (Uba) Worthy Park, Hampden, Tilston, Gales Valley, Mexico, Caymanas, Cave Valley, Friendship, Blue Castle, Amity Hall, and Northern Estates. (Uba).

Just as soon as the recently imported seedling canes at Hope are ready for cutting, they will be sent out to representative centres, and experimental tests carried out under field conditions.

Nurseries.—Seedling cane nurseries have been started in three parishes during the year. Two in St. Thomas, one at Potosi and the other at Duckenfield under the management of Mr. H. G. Coote, from the Department. One at Chapelton at Dank's Estate by kind permission of Dr. A. Grinan under the management of Mr. G. Dalrymple, the overseer at Dank's. The other at Cornwall in Westmoreland, by kind permission of Mr. Edward Morris, under the management of Mr. Thomas Hall, the overseer at Blue Castle.

The nursery at Montpelier has been greatly improved during the past year. Mr. J. W. Edwards has most kindly consented to an enlargement of this nursery by giving over to the Department an additional five acres of land ideally situated by the railway.

Mosaic Disease of Cane.—Two new centres of this disease were discovered during the year, one at Trout Hall near Frankfield, and the other near Cambridge in St. James. This disease is particularly severe on the Governor Cane grown extensively in the Frankfield districts. I gave a demonstration lecture to the Branch Agricultural Society at Frankfield on this disease, the eradication of which is being followed up by the small settlers of the district.

I am, however, of the opinion that planters, with but few exceptions, are not yet fully alive to the danger of this disease, and if possible further efforts should be made to eradicate it. I have seen excellent results obtained at Long Pond, Trelawny, where systematic roguing has been done. Were planters really in earnest over the matter, the eradication of the disease would have been much more advanced than it is at present. In some cases where the disease has taken hold extensively as in some parts of Trelawny Clarendon and Westmoreland, vigorous steps are necessary if the spread is to be checked.

Sisal.—During the year two cases of Sisal Disease were reported, one in Portland and the other in Hanover. In both cases the so-called disease consisted of a fungoid blackening of the leaves, in one case starting at the tip of the leaf and in the other case at the base. In both instances only mature leaves were attacked, and in no case were the heart leaves or bud of the plant affected. The loss of leaf due to the disease was not greater than one-tenth of one per cent., which would be greatly reduced under manufacturing conditions, as only fully mature or over-ripe leaves showed signs of the disease.

I made a second cutting of the 1,000 Sisal plants at Lititz, the leaves of which were cut in the year previous for purposes of determining the yield per acre of this cultivation. The following results were recorded:—

	Cut Nov. 1919.	Nov. 1920.
Average of leaves fit to cut per plant ..	32	30
Average yield of leaves in lbs. per plant ..	.19	.18
Average weight of single leaf ..	9.6 oz.	9.7 oz.
Recovery of fibre (by hand) per cent ..	3.4	3.93
Fibre per 100 plants in lbs. ..	646	759
Yield per acre in fibre at normal distances of 6 x 5 ..	938	1,029
Total of two cuttings	..	1,967

The results are very encouraging as the drought at Lititz in 1920 was one of the most severe on record. It will be noticed that the percentage of fibre has increased from 3.4 to 3.93 and the gross return of fibre per acre is 1,079 lbs. as against 938 lbs. the previous year.

Dipping Tanks.—There is an ever increasing demand by the public for Dipping Tanks. The improvement in the condition of a herd after dipping has been started on a property is most marked. Not only are the ticks kept in control and gradually diminished to a vanishing point but the business of handling the cattle has been made more pleasant to all concerned. A most marked feature in the recent severe drought was that on those properties provided with Tanks their losses of cattle were negligible, while the tick infested pens suffered heavily.

Tanks have been erected on the following pens during the year, either directly under my supervision or by my advice; Charlemont, Roehampton, Lilyfield, Georges Valley, Bog, Grove Place, St. Jago, Rhymesbury, Prospect, New Ground.

Trypan Blue.—In two cases I have been requested by penkeepers to try an injection of Trypan Blue in the veins of anaemic cattle and determine if it would improve their conditions and so help them to withstand long spells of drought. In both cases where these experiments were made I have received gratifying accounts of the improvement from the use of the Blue. In one case in particular twenty head of the weakest cattle were selected and injected; only one of those so treated died, while many that were considered safe at the time went under. The results were so marked that I received a request to Blue another lot of sixty head. There is no doubt that Trypan Blue has been a useful means of helping penkeepers in their efforts to keep alive poor and anaemic cattle in times of drought and shortage of food, by the destruction of tick fever parasites in the blood.

I have the honour to be,

Sir,

Your obedient servant,

P. W. MURRAY,
Superintendent of Agriculture.

Sir,

I have the honour to submit my Report on the Experiment Station for the nine months ending December 31st, 1920.

I sailed from Barbados on March 11th, 1920, and arrived in the Island on April 7th to take up my duties

On assuming my duties I found that all the varieties of canes with the exception of the Uba and P.O.J.100 were attacked by the Mosaic or Mottling disease of sugar-cane. In some of the varieties the incidence of attack was as high as 15%.

I continued the work that was being done in the Station before turning my attention otherwise. My methods were:—

1. Digging out all disease infected stools from the young plant canes.

2. Planting and supplying with healthy canes and canes immune or resistant.

3. Digging up the stools in all the old infected cane fields and now with the exception of an occasional infected cane the Station is free of the Mosaic Disease.

From the continuous digging out of the diseased stools wide gaps appear in the field which gives a very bad appearance, but I may also mention that it is also due to the terrible drought experienced this year, the rainfall being 27.36 inches below the average for the past 40 years.

As a result of the late planting and continuous roguing and replanting of the fields no inflorescences were obtained for the purpose of crossing and growing seedlings.

For the purpose of hybridising several of the best varieties were selected and planted out in single rows alongside each other. However, none of these varieties flowered owing to their being planted too late but if conditions are favourable next year I hope a large number of seedlings will be obtained.

One of the seedlings received from Barbados, No. B.S.F. 12 (34) was lost owing to the attack of all the stools by the Mosaic disease.

Healthy cuttings have been made of all the varieties obtainable and planted and it is hoped that cuttings will be available for distribution next year as owing to the Mosaic in the Station only the Uba, which was found to be immune, was distributed to planters.

Two packets of seed of *Saccharum ciliare* were received from the Agri-Horti Society of India, Alipur, Calcutta. Only four seedlings were obtained, but unfortunately two died after being planted out. The other two are making satisfactory growth.

Pines.—A pinery has been again started and one acre has been planted out in beds and considering the drought experienced when they were planted, they are doing well. The following varieties were planted:—Black Jamaica, Red Spanish, China, Sugar-loaf and Ripley.

Before closing my report I must mention my appreciation of the kindness of Mr. P. W. Murray the Superintendent of Field Experiments in taking me to several sugar estates and introducing me to the planters that I might get information on the methods of cultivation existing in the different sugar cane districts.

Mr. H. R. Angell, the Agricultural Master at the Farm School, undertook for the benefit of the students the responsibility of carrying out the experiments with the undermentioned crops and reports as follows:—

Cocoa.—During the year under review the plot of young cocoa which had been enclosed was again opened up. Careful pruning was done and the plants that had died out were supplied and the whole plot was put in good order. The results have been very satisfactory, many of the plants having borne over 100 pods. The old plot suffered severely as a result of the drought; quite a few of the trees died out. This plot has also been carefully attended to and as a result of the favourable weather obtaining since January it is now in good condition.

Coffee.—The usual pruning was done. Gormandizers have been encouraged to take the place of plants that had suffered as a result of the drought and other adverse conditions. Bananas have been planted in the rows as shade plants.

Cassava.—A plot of the best Trinidad and Jamaica varieties was established during the year. These will be harvested during next year and those that show sufficient merit will be further cultivated and cuttings from such varieties will be available for distribution.

Some of the bitter varieties will be allowed to remain over for two years as is the general practice in Jamaica.

Cotton.—Four square chains of Cauto Cotton were planted at 8' x 8'. The plants are in good condition and promise very favourably.

Bananas.—The plot established last year suffered very much from the drought as no irrigation water was available. It is now doing well.

Citrus.—The varieties imported from Florida are doing well, receiving a great deal of attention from the Students whose garden embraces part of the plot. Spraying for the control of the "Black-Scale" has been regularly done. Pruning was done during the year.

Mangoes.—There are now 99 Bombay mangoes growing along the Station paths, 40 in the plot to the east of the tobacco house, and 38 in the mango grove proper. Owing to the drought prevailing our budding operations were unsuccessful. Besides the Bombay we have the following varieties: Arbutnot, Julie Cambodiana, Mulgoba, Sandersha, Gollan, Gordon, Strawberry, Singapur, Fernandez, Langra, Bernarsi, Fuzli, Amini, Malda, Pahutan, Rajpury.

Agricultural Education.—The Farm School and Mico Students received regular instruction in the above-mentioned crops. The former have performed throughout the year the varied operations necessary in farm practice, including the preparation and application of fungicides and insecticides, ploughing, harrowing, manuring, mulching, irrigation, drainage, budding and pruning. They certainly deserve commendation for the deep interest they have shown and the excellence of the work done.

I have the honour to be,

Sir,

Your obedient Servant,

W. S. GOODMAN,
Plant Breeder,

LITITZ FIBRE PLANTATION.

Labour Expenditure, 1920-21.

	Weeding Field & Plantation.	Weeding Nurseries & Spraying.	Planting.	Super- vision.	General Expenses.	Total.
1920—	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.	£ s. d.
April ..	18 3 1	14 6 4		3 0 0	0 9 6	36 13 11
May ..	37 11 10	21 15 10	8 15 0	3 15 0	1 14 0	73 11 8
June ..	109 3 7	36 1 11	17 1 0	3 0 0	0 11 0	165 17 6
July ..	320 6 3	75 13 9	2 16 0	3 15 0	2 4 6	404 15 6
August ..	236 2 4	49 15 6	11 4 0	8 7 6	1 1 6	306 10 10
Sept. ..	225 17 1	50 12 2	11 4 0	4 0 0	0 17 0	292 10 3
October ..	150 17 1	52 3 2	64 8 0	5 0 0	1 2 6	273 10 9
November ..	146 9 10	45 1 3	15 15 0	4 0 0	1 2 6	212 8 7
December ..	16 0 4	8 0 2	5 19 0	5 0 0	3 0 6	38 0 0
1921—						
January ..	8 14 4	4 7 2	5 5 0	4 0 0	1 15 6	24 2 0
February ..	8 19 6	7 11 0	0 10 6	4 0 0	3 5 0	24 6 0
March ..	5 8 7	7 12 5	4 14 9	4 0 0	2 4 6	24 0 3
	1,283 13 10	373 0 8	147 12 3	51 17 6	19 8 0	1,875 12 3

523 acres cleaned and weeded during the year.
106 acres planted out during the year.

LITITZ FIBRE PLANTATION—RAINFALL, 1920.

	Inches.
January	1.41
February	3.94
March	0.39
April	0.00
May	8.22
June	0.44
July	0.13
August	6.87
September	2.42
October	1.96
November	2.85
December	0.69
	29.32

IV.—AGRICULTURAL EDUCATION.

Report by the Headmaster, Farm School.

12th April, 1921.

Sir,

I have the honour to submit the annual report of the Farm School for the year, 1920-21.

Students.—The number of students in residence has been the largest since the inception of the school. The following have been the figures for the year:—

Midsummer	40
Christmas	41

We have accommodation for 44 students.

The following students completed their third year and were awarded certificates:—

G. G. Girvan

E. Longmore

Staff.—The only change in the staff was the appointment of Miss Carrington as Matron vice Miss Hemming.

Curriculum.—The usual routine of the school has been carried out.

The students as usual rendered valuable assistance to the Stock Farm. The presence of the animals for the Manchester Beef Stud Farm, at Hope, afforded the students an opportunity of seeing some excellent "Beef Breeds" as well as a lesson in the acclimatization of imported bulls.

General.—The demand for reservations in the School still continues to be in excess of our accommodation. We could easily have had an additional twelve students in January if we had the accommodation.

The work of the school is considerably handicapped by lack of equipment. We want a properly equipped workshop and a tractor with a complete complement of ploughs. The school has now no laboratory consequent on the arrival of the Entomologist.

The absence of a reliable lighting system is also a serious handicap both to the class-room work as well as the maintenance of discipline.

I have the honour to be,

Sir,

Your obedient Servant,

(Sgd. R. S. MARTINEZ,
Headmaster.

Half-way Tree, April, 8th 1921.

Sir,

I have the honour to submit the following report on the health of the students of the Farm School during the year ending December, 31st 1920.

The general health of the students has been good.

Several cases of Influenza of a mild type occurred during the year and one student developed Lobar pneumonia.

On account of the prevalence of Alastrim, steps were taken to see that all the students were vaccinated. Therefore no student has contracted this disease.

I am, Sir,

Your obedient Servant,

LEWIS A. CROOKS.

The Honourable,
Director of Agriculture,
Hope.

Report by Veterinary Consultant:

Merton, Half-way-Tree, June, 15th 1921.

The Honourable,
Director of Agriculture, Hope.
Sir,

I have the honour to submit my report for the nine months from April to December, 1920.

As Veterinary Consultant my work has consisted mainly of two parts; firstly to lecture to the students, who received instructions in the various branches of Veterinary science, as also to the Agricultural Instructors on Blackleg and Anthrax; secondly to treat such cases as I was requested by you.

The lectures to the various classes of students included the principles of the following subjects respectively.—

- 1st year (a) General anatomy of the horse with references to the other domestic farm animals.
- (b) Stable management and routine with methods of securing animals, the points of the horse, grooming etc.
- 2nd year (a) Veterinary Physiology including digestion, respiration etc.
- (b) Hygiene, including water supply, ventilation, foods and feeding.
- 3rd year (a) Pathology
- (b) Medicine
- (c) Surgery—Simple and contagious diseases and minor operations.
- (d) Shoeing
- (e) Pharmacy
- (f) The care and treatment of animals, mares, foals and foaling, cows, calves and calving, ageing animals, etc.

I visited 'Hyde Hall' and 'Summers Hill' in St. James, 'Enfield' in Manchester and 'Norris' in St. Thomas to investigate outbreaks in disease among cattle under the Contagious Diseases of Animals Law, but in no case could any trace of Anthrax or other such contagious disease be found.

In addition to these duties I carried out twenty seven bacteriological tests for 'Anthrax' and nine for 'Texas fever' and examined and reported on pathological specimens referred to me by your department.

I am glad to be able to report that all tests for 'Anthrax' gave negative results and in my opinion the presence of this disease in Jamaica has yet to be proved

I have the honour to be,

Sir,

Your obedient Servant,

(Sgd.) G. O. RUSHIE GREY, M.R.C.V.S., B.Sc. (Lond.)

Government Veterinary Consultant,

V.—INSPECTION OF PLANT DISEASES.

During the year 1920 four Inspectors of Plant Diseases were available for supervising the working of the Protection from disease (plants) Law of 1915. Mr. S. Scudamore was stationed at Montpelier and had to supervise a large area extending from St. Ann to the Western parishes. The parish of St. Ann has recently been transferred to the area supervised by the Inspector for St. Mary.

Mr. J. B. Sutherland was in charge of Panama Disease of Bananas in Portland. Mr. H. G. Coote, stationed at Golden Grove in St. Thomas, was in charge of that parish and occasionally worked elsewhere as required. Mr. J. E. Carpenter was stationed in St. Mary and devoted himself exclusively to the requirements of this important banana parish.

The records of Panama Disease of Bananas are shown for the financial year 1920-21 in order to be comparable with those of previous years. In the month of March the very large number of 332 diseased plants was recorded, more than in the whole of the previous year, due to the discovery of a neglected area of small settlers' gardens in upper St. Ann where Bananas were grown for food and not for export. The records for the year show a decided increase in the incidence of the disease. This was to be expected from the revival of the industry after a period of depression and the large replanting of bananas that took place in 1920. The weather was also favourable for the spread of the disease.

Although the incidence of the disease is still very small as compared with an output of ten million stems of bananas, the experience of the past ten years shows that constant vigilance and watchfulness are required in order to keep this insidious disease from spreading so as to seriously injure the banana industry of the Colony.

It has now been proved that *Banana trash* is one of the chief ways in which the disease is spread. Posters have been affixed at all important wharves and buying stations warning the public as to the danger of using banana trash on their fields.

But for the financial situation I should have considered it my duty to ask for an addition to our staff of Inspectors so that a closer watch could be kept on the disease by resident Inspectors in all the chief areas where this disease has been discovered.

All four Inspectors rendered valuable services during the year by organising plant nurseries which they supervised in addition to their normal duties.

PANAMA DISEASE REPORT FOR THE YEAR 1920-1921.

	Total No. of Diseased Plants.	New Infected Districts.	New cases.	Recurrences.	Total cases.
1920.					
April	57	..	1	17	18
May	12	..	1	7	8
June	100	1	5	7	12
July	33	1	1	5	6
August	6	..	..	4	4
September	28	..	1	4	5
October	40	2	6	14	20
November	33	..	6	4	10
December	73	..	6	9	15
1921.					
January	13	..	5	4	9
February	34	1	7	5	12
March	332	..	11	23	34
Total for year	761	5	50	103	153

Record of diseased plants for the whole Island for ten (10) years to 1920-21.

1911-1912	..	685	First discovery
1912-1913	..	20	No inspection
1913-1914	..	156	Inspection started
1915-1916	..	236	
1916-1917	..	163	
1917-1918	..	125	
1918-1919	..	273	
1919-1920	..	255	
1920-1921	..	761	

VI.—LIVE STOCK.

I.—GOVERNMENT STOCK FARM, HOPE.

The year 1920 was the most difficult ever experienced at Hope owing to the deficient rainfall. The year's rainfall of 26.24 inches, as against an average of 53.6 inches for 40 years, and the lowest recorded for 48 years, rendered the feeding of the animals very difficult.

Our Silo capacity of only 100 tons was soon exhausted, while the Mosaic Disease treatment required for the sugar canes deprived us of our usual supply of fodder canes. In the month of August grass from Temple Hall had to be carted to Hope at a cost of £6 per diem. Again, the cost of imported feeding

stuffs was the highest in recent history, and the cost of feeding the newly imported cattle was very great. The milk-yield also fell greatly below the estimate so as to reduce the revenue from the Dairy Herd by about £1,800 for the year.

Our operations therefore show an excess expenditure of £2,000 over Revenue for the financial year and the Working Account was placed in a temporary state of deficit. With the advent of normal weather however, a great improvement has since set in and the financial situation will be satisfactorily adjusted during the current year.

Thanks are due to the Legislative Council for authorising the Public Works Department to undertake certain greatly needed improvements for the Farm at Hope.

These consist of four cool and airy stables, each in a special paddock, the addition of eighteen cow stalls to the old range of buildings, the enlargement of the grain store-room and the erection of a splendid concrete monolithic Silo, 16'x42', capable of holding 190 tons of Silage. An other work of improvement was the construction in the "Mango Walk Pen" of a tropical dairy building with stanchions for 26 cows. The floor and mangers are of concrete, the rafters of native hard wood and the roof of thatch palm. The stanchions are of steel wood-lined. This structure is a great success and enables the native dairy herd depastured in the Mango Walk to be fed and milked in an efficient manner whereby a marked improvement in the milk yield of these cows will result.

The following pedigree dairy cattle have been imported for the Hope Farm:—

Jersey Cows—

(1) "Etta of Friendship" 340,193 A.J.C.C., cost £205, Register of Merit Record Fat at 2 years 359 lbs.

(2) "Meridale Perfection" 375,935 A.J.C.C. cost £221, Register of Merit Record 334 lbs fat at 2 years.

Holstein Friesian Bull

"Far Oaks Sir Pauline Homestead" 245,115. Cost £240 (a prize-winner at Minnesota State Fair 1918) Sire *Piebe Laura Ollie Homestead King* with 7 daughters with records of over 20,000 lbs milk as 2 year olds.

Dam *Pauline Alice Paula*, Record 16,108 lbs milk.

Ayrshire Cattle—

Bull—"Auchenbrain Cyril" 17,535. Cost £219.

Cows:—"Bruchag Ruby II" 49,401. Cost £159, "Friendslesshead Brown Blossom II", 65,364 Cost £159, "Glenside Jess 3rd" 65,517, Cost £159.

These cattle were selected by the famous Ayrshire Breeders, Messrs. Wallace of Auchenbrain, Scotland.

Guernsey Bull

"Elfordleigh Prince" 3,511. Cost £229, 1st prize Royal Cornwall Show 3rd prize Royal Agricultural Society of England. Purchased from Her Royal Highness the Duchess of Albany.

Jersey Bull—

"Pogis 99th of Hood Farm the 40th" 155,511, Sire *Champion Pogis 99th* with 84 daughters in the Register of Merit. Cost £309.

Dam *Lass 50th of Hood Farm*, record 444 lbs fat at 2 years. Purchased from the Hood Farm, Lowell, Mass, U.S.A.

The pedigree Beef Cows and bulls for the new Stud Farm at Grove Place were received at Hope and acclimatised there before being forwarded to Grove Place. The Farm School students under Foreman Lewis undertook the care and treatment of these animals with the most satisfactory results. Not a single imported animal was lost during the year, and by the use of Trypan Blue the tick-fever was successfully dealt with. This work was very exacting and I consider that great credit is due to those who undertook the care of the imported stock for the success with which they were dealt with at Hope.

Trypan Blue.—During the war it was impossible to obtain fresh supplies of Trypan Blue which was a special product made at the Hoechst factory in Germany. Our stock deteriorated and eventually it became entirely inert. We have since obtained supplies of Trypan Blue from two sources in England and from the original manufacturers in Germany. Experience has shown that Trypan Blue is exceedingly hygroscopic and unless sealed up in hermetically closed vessels it rapidly deteriorates under tropical conditions. Two years ago we lost two valuable bulls from tick-fever due to the lack of effective Trypan Blue. We now secure a fresh stock every three months and great care is taken to keep the dye from the access of moisture.

The success on the acclimatisation of the large number of valuable pedigree cattle at Hope in 1920 must to a great extent be ascribed to the use of Trypan Blue. The secrets of success are (a) early treatment of the affected animal, (b) repetition of the injection where a recurrence of fever takes place, (c) freshly made solution from fresh stocks of the dye kept in the dark in hermetically sealed bottles.

Evidence has been gained of the great economic value of Trypan Blue for the treatment of native cattle affected with the parasite of tick-fever in the blood. Its use will doubtless spread, and at no distant date Trypan Blue will be recognised as a most valuable specific for tick-fever in Jamaica.

CONTAGIOUS ABORTION.

It is satisfactory to record that this trouble has been very successfully dealt with at Hope and that it no longer gives us cause for any serious anxiety.

In 1920-21 the number of calves born at Hope was one hundred and eleven (111). Five cows that had previously aborted again slipped their calves. Four cows lost calves from mechanical causes. Only one new case of abortion, and this probably not a "contagious" case, arose during the year. Not a single heifer became infected and it is abundantly clear that with great care in isolating and disinfecting all cases of abortion and the systematic disinfection of bulls after service that this disease can be successfully controlled under our conditions in Jamaica.

DISTRIBUTION OF BULLS.

During the year 26 dairy bulls were sold to the public in addition to three 2 year old bulls presented to the Jamaica Agricultural Society for the use of their branch societies. During the first 10 years of the work of the Hope Farm ending in December, 1920, two hundred and three (203) dairy bulls have been issued to the public.

IMPORTATION OF ZEBU CATTLE FROM INDIA.

As the Hope Farm was too restricted in area to make possible the breeding of pure-bred Indian Zebu cattle it was considered that the Farm could best help the breeders in the Colony by organizing co-operative importation of bulls from India. Eleven bulls were landed in December ex S. S. "Sutlej", Unfortunately there was bad weather in rounding the Cape of Good Hope and five bulls died on the voyage. As it was not possible to get insurance effected on these bulls through the ordinary channels the Farm had to undertake this risk and an estimated loss of £357 was caused by this first consignment of bulls. The following cattle have been purchased in India for introduction into Jamaica.

14	Nellore bulls
6	Nellore heifers
17	Hissar bulls
6	Gujerat bulls
2	Montgomery bulls

Total 58 head

It is confidently hoped that this enterprising introduction of fresh Zebu blood will prove of great service to our herds of working cattle in the Colony and lead to a profitable export trade with our neighbours in the Caribbean.

GOVERNMENT STOCK FARM, HOPE.

On the 31st March, 1921, the Live Stock belonging to the Government Farm at Hope, consisted of the following animals:—

CATTLE.

Pedigree Stock—

36	Red Polls	..	..	1	Imported Red Poll Bull
				7	Native Red Poll Bulls
				7	Imported Red Poll Cows.
				21	Native Red Poll Cows and heifers
28	Jerseys	..	..	1	Imported Jersey Bull
				8	Imported Jersey Cows
				19	Native Jersey Cows & heifers
6	Guernseys	..	..	1	Imported Guernsey Bull
				1	Native Guernsey Bull
				2	Imported Guernsey Cows
				2	Native Guernsey heifers
5	Ayrshires	..	..	1	Imported Ayrshire Bull
				1	Native Ayrshire Bull
				2	Imported Ayrshire Cows
				1	Native Ayrshire heifer
4	Brown Swiss	..	..	1	Native Swiss Bull
				3	Native Brown Swiss heifers
1	Holstein	..	..	1	Imported Holstein Bull
32	Zebu Jerseys	..	..	2	Zebu Jersey Bulls
				30	Zebu Jersey Cows and heifers
Total Pedigree Cattle				..	112

Non-Pedigree Stock—

	1	Grade Holstein Bull
	4	Grade Guernsey Bulls
	1	Grade Red Poll Bull
	2	Grade Zebu-Jersey Bulls
	5	Grade Canandian Dairy Cows
	70	Native Dairy Cows
	3	Native Breeding Cows
	3	Native heifers
	15	Grade Zebu Jersey heifers
	4	Grade Jersey heifers
	16	Grade Guernsey heifers
	24	Grade Holstein heifers
	2	Grade Red Poll heifers
	3	Grade Brown Swiss heifers
Total Non-pedigree Cattle	..	153
		9 Plough Steers
Total Number of Cattle	..	274

HORESKIND.

2 Geldings
 8 Working Mules
 POULTRY.
 4 Pens—
 Rhode Island Red
 White Leghorn
 Plymouth Rock
 Indian Game
 BEES.
 23 Colonies

WEEKLY ANALYSIS OF MILK SUPPLIED TO THE PUBLIC HOSPITAL AND LUNATIC ASYLUM BY THE FARM, 1929-21.

Quarter ending.	Solids.	Fat.	Sp. Gravity.	Solids not Fat.
June, 30, 1920	13.42	4.62	1.0309	8.80
September, 30, 1920	13.42	4.67	1.0305	8.75
December 31, 1920	13.08	4.45	1.0303	8.63
March 31, 1921	13.07	4.43	1.0304	8.64
Av. for the year 1920-21	13.25	4.54	1.0305	8.71

The following is the summary of the Valuation of Live Stock at the Farm on the 31st December, 1920:

Cattle	..	..	£9,136
Horsekind	..	..	262
Bees	..	..	46
			£9,447

RECORD OF DAIRY HERD MILK YIELD 1920.

Month.		Av. No. of Cows.	Total qts. per mensem.	Av. per Cow qts.
January	..	65	8,674.9	4.3
February	..	67	8,695.0	4.5
March	..	53	7,598.9	4.6
April	..	56	7,188.6	4.3
May	..	53	6,029.2	3.6
June	..	47	5,606.7	4.0
July	..	52	6,036.4	3.7
August	..	60	5,782.3	3.1
September	..	54	6,211.9	3.8
October	..	56	7,773.2	4.5
November	..	60	8,605.0	4.7
December	..	58	7,149.7	4.0
Average	..	57	85,351.8 qts.	4.1

MILK YIELD, DAIRY HERD—1919, 1917, 1918, 1919, 1920.

Imperial Quarts per diem.

Month.	1916.	1917.	1918.	1919.	1920.
January	236.2	203.8	282.4	270.8	279.8
February	221.4	214.1	257.5	305.1	299.8
March	255.2	193.5	231.9	268.7	245.1
April	226.4	223.8	265.9	276.7	239.6
May	259.8	266.7	226.1	383.6	194.5
June	241.2	258.7	211.8	394.4	190.2
July	232.9	249.7	231.7	308.8	194.7
August	207.0	229.3	273.7	286.2	186.5
September	200.7	248.0	302.7	312.7	207.1
October	191.6	273.4	298.3	316.7	250.7
November	223.8	281.3	378.0	255.0	286.8
December	228.2	268.2	318.3	241.5	230.6
Average	227.0	242.5	273.2	302.5	233.8

MILK YIELD 1920, DAIRY HERD HOPE STOCK FARM.

Order.	Cow.	Breed.	Age in years.	Average Content Milk Fat.	lbs of Milk..	Milking Weight.	Maximum yield Imp. Quarts.	*Sale value of Milk.
								£ s. d.
1	Monica	Grade Guernsey	10	4.5	4,603	880	9.6	67 4 4
2	Carmen	do	6	3.5	4,485	694	9.7	65 3 10
3	Lydite	Holstein Ayrshire	9	4.0	4,372	856	8.4	65 11 4
4	Monica 2nd	Grade Zebu-Jersey	4	4.5	4,246	868	11.2	61 11 11
5	Rosette	Grade Guernsey	6	4.5	4,138	712	9.3	62 7 7
6	Honeybelle	Jersey (American)	10	5.5	4,127	818	13.2	65 16 8
7	Pobess	Grade Red Poll	6	3.9	4,034	936	9.3	60 2 4
8	Norbrook	Indian Ayrshire	6	5.1	3,928	1,092	10.1	55 1 5
9	Beta	English Red Poll	9	3.7	3,918	980	11.5	55 12 3
10	Larva	Zebu-Jersey	5	4.4	3,859	806	12.2	59 10 4
11	Sola 2nd	Grade Zebu-Jersey	4	4.5	3,776	852	11.2	60 2 7
12	Diva	Grade Guernsey	9	6.0	3,759	712	10.6	57 11 11
13	Dolly	Zebu-Jersey	6	5.0	3,644	905	10.8	54 5 8
14	Monica 1st	Grade Zebu-Jersey	5	5.1	3,640	760	10.0	56 9 2
15	Diva 2nd	Zebu-Guernsey	5	5.5	3,387	828	10.5	50 5 3
16	Iona	Grade Holstein	3	4.1	3,356	776	9.8	53 10 5
17	Fanny	Grade Jersey	9	4.9	3,315	820	8.6	53 10 11
18	Bunny	Grade Holstein	4	5.3	3,238	1,054	10.8	49 12 1
19	Marchioness 1st	Zebu Jersey	4	4.8	3,236	756	7.9	49 19 1
20	Shrew 1st	Grade Guernsey	6	3.9	3,170	954	12.6	49 13 0
21	Purity	American Red Poll	6	4.1	3,110	1,092	11.3	54 11 10
22	Mirage	Zebu-Jersey	8	4.7	3,068	886	5.9	49 6 8
23	Rum	Grade Jersey	4	5.2	3,066	710	7.1	49 16 5
24	Butterfly	Jersey (American)	11	5.1	3,032	750	11.2	42 19 4
25	Pussy	Grade Red Poll	5	..	3,027	842	8.7	45 8 7
26	Desiree 1st	Red Poll	4	3.9	3,016	790	8.6	40 9 1
27	Lady Geneva	Amer. Red Poll	5	4.1	2,970	1,034	7.0	47 11 0
28	Honey	Zebu-Jersey	6	4.1	2,968	955	11.3	39 16 9
29	Badge 1st	do	4	5.5	2,854	818	6.2	45 19 10
30	Tilda	Grade Red Poll	7	4.2	2,848	1,150	7.2	39 18 8
31	Ethelstine	Jersey (native)	7	5.5	2,837	860	9.9	38 2 5
32	Jahnetstine	Jersey (American)	10	4.4	2,747	760	10.8	34 17 0
33	Cigarette 1st	Zebu-Guernsey	5	5.1	2,628	760	5.8	38 1 0
34	Dora	Grade Jersey	5	4.2	2,482	666	6.4	38 18 11
35	Tit	do	4	4.0	2,407	916	10.7	36 15 0
36	Pigeon 1st	Zebu-Jersey	4	4.5	2,281	896	8.6	33 14 8
37	Hope Beta 1st	Red Poll	3	4.1	2,167	724	6.3	29 14 7
38	Miracle	Zebu Jersey	6	6.3	2,143	990	14.5	25 8 5
39	Mona	Jersey (American)	7	5.7	2,131	1,000	9.2	28 18 6
40	Canna	Grade Holstein	4	3.8	2,108	884	10.8	28 10 2
41	Badge	Zebu-Jersey	7	4.5	2,068	771	7.5	31 11 9
42	Sola	Zebu Shorthorn	8	4.3	2,054	1,150	10.5	34 2 7
43	Pride's Monica	Grade Guernsey	6	4.4	2,049	794	9.3	27 13 2
44	Gertie	Grade Holstein	3	5.1	2,035	834	6.5	31 18 1
45	Diva 1st	Grade Guernsey	6	4.8	2,018	776	5.3	27 17 2

*Milk was sold at 7d. per quart from 1st January to 31st March
8d. per quart from 1st April to 31st May
11d. per quart from 1st June to 31st December.

THE NATIVE DAIRY HERD AT HOPE.

The following list records the daughters of the various bulls that have been used at Hope since the commencement of the Farm in 1910 which now represent the native dairy herd.

Name of Sire.	Daughters in Head.		
	Pedigree.	Non-Pedigree.	Total.
<i>Jersey—</i>			
Native Bull "Trojan" ..	..	3	3
Imported Bull "Blinker" 4,471 (Imp. June, 1911) ..	1	1	2
Imported Bull "Sophie's Oxford" J. 2 (imp. in dam in 1911) ..	1	1	2
Native Bull "Rothschild's Golden Lad" Ja. 8 ..	2	..	2
Imported Jersey Bull "Draconis of St. Lawrence" Ja. 3 (Imp. in dam in 1911) ..	1	2	3
Imported Bull "Mr. Polo of Bleak House 26th " 153,417 A.J.C.C. (Imp. August, 1917.) ..	5	1	6
Imported Bull "Sophie's Jacoba Hector" 132,615 A.J.C.C. (Imp. September 1917.) ..	9	13	22
Total ..	19	21	40
<i>Zebu Jersey—</i>			
Native Bull "Experiment" ..	..	23	23
Native Bull "Diadem" ..	..	3	3
Native Bull "Tipperary" ..	..	23	23
Native Bull "Petruchio" ..	..	4	4
Native Bull "Mr. Hawkins" ..	..	3	3
Total ..	..	56	56
<i>Shorthorn—</i>			
Native Bull "Fitzbeau" ..	..	1	1
<i>Red Poll—</i>			
Imported Bull "Rendlesham Royal Bey (Imp. September, 1911.) ..	2	7	9
Imported Bull "Sudbourne Crowfoot" J. 6 (Imp. in dam in 1911) ..	6	4	10
Imported Bull "Panama Junior" (Imp. February, 1919) ..	9	2	11
Total ..	17	13	30
<i>Brown Swiss—</i>			
Imported Bull "Trumpeter II of Hintonway" 4,606 (Imp. April, 1929) ..	1	7	8
<i>Guernsey—</i>			
Imported Bull "Glenwood's Hazel's Pride " 23,956 (Imp. July, 1913) ..	..	6	6
Imported Bull "Lily's Plato" 40,836 (Imp. October, 1917) ..	1	19	21
Total ..	2	25	27
<i>Holstein-Friesian—</i>			
Imported Bull "King Pontiac Monroe Pohlercrest" 185,351 (Imp. November 1917.) ..	..	25	25
Imported Bull "Far Oaks Sir Pauline Homestead" 245,115 (Imp. June, 1920) ..	..	3	3
Total ..	..	28	28

STOCK FARM WORKING ACCOUNT, 1920-1921.

<i>Revenue—</i>			£	s.	fd.	£	s.	d.
Services & Pasturage	..	..	60	6	10			
Tenants	..	..	108	3	2			
Sale of Stock	..	..	1,135	5	11			
Milk	..	..	2,938	12	7			
Cordwood	..	..	399	14	3			
Miscellaneous	..	..	1,710	5	4	6,352	8	1
<i>Expenditure—</i>								
Motor Van	..	..	411	2	7			
Wages	..	..	846	2	4			
Repairs and Implements	..	..	296	5	0			
Food for Stock	..	..	1,658	15	8			
Clearing and fencing	..	..	756	4	5			
Purchase of Stock	..	..	1,704	3	10			
Cordwood	..	..	285	4	4			
Pimento Leaves	..	..	101	17	1			
Rearing Calves	..	..	281	9	0			
Foreman	..	..	40	0	0			
Miscellaneous	..	..	1,975	11	7	8,356	15	10
Excess Expenditure	..	..	..			2,004	7	9
Cash Balance 1.4.20	..	..	..			662	9	11
Cash Deficit 31.3.21	..	..	..			1,341	17	10

LIVE STOCK CAPITAL ACCOUNT, 1920-1921.

<i>Capital Estimates—</i>					
1909-1910	..	..	500	9	0
1910-1911	..	..	247	0	0
1911-1912	..	..	883	12	4
1912-1913	..	..	710	0	7
1913-1914	..	..	..		
1914-1915	..	..	..		
1916-1917	..	..	..		
1917-1918	..	..	..		
1918-1919	..	..	..		
1919-1920	..	..	..		
1920-1921	..	..	..		
Total Capital from General Revenue	2,341	1	11		
Valuation 31st March, 1921	9,678	0	0		
• Balance at credit 31.3.21	7,336	18	1		
Balance at credit 31.3.20	4,587	18	1		
Improvement during year 1920-21	2,749	0	0		

PROGRESS RECORD.

Balance at credit 31.12.12	..	1,237	8	1
Balance at credit 31.12.13	..	1,022	3	1
Balance at credit 31.3.15	..	627	9	7
Balance at credit 31.3.16	..	567	4	1
Balance at credit 31.3.17	..	1,077	19	1
Balance at credit 31.3.18	..	2,041	6	1
Balance at credit 31.3.19	..	2,821	12	1
Balance at credit 31.3.20	..	4,587	18	1
Balance at credit 31.3.21	..	7,336	18	1

PROVISIONAL BALANCE SHEET TO 31ST MARCH, 1921.

	£	s.	d.		£	s.	d.
Live stock, net purchases 1909-20 ..	2,014	19	3	Live stock ..	9,678	0	0
Live stock purchases 1920-21 ..	568	17	11	Dead Stock and buildings	758	9	0
Accounts payable ..	10	9	10	Food ..	347	10	0
Deposits for Indian Bulls. . .	885	0	0	Accounts receivable	484	12	8
Debit Balance at Treasury ..	2,409	0	0	Kintyre Pen	300	0	0
	5,888	7	0		11,568	11	8
Balance Assets	8,025	16	10	Charges on Indian Bulls receivable	2,345	12	2
	13,914	3	10		13,914	3	10
				£	s.	d.	
Balance Assets, 1920-21 ..	8,025	16	10				
Balance Assets 1919-20 ..	7,437	7	5				
Improvement in year's work	588	9	5				
Less loss on Insurance Indian Bulls	357	0	0				
	231	9	5				

PROGRESS RECORD.

	£	s.	d.
Improvement on year's work, 1916-17 ..	825	3	7
Improvement on year's work, 1917-18 ..	903	1	6
Improvement on year's work, 1918-19 ..	584	7	5
Improvement on year's work, 1919-20 ..	3,093	6	11
Improvement on year's work, 1920-21 ..	588	9	5

II.—GOVERNMENT STUD FARM AT "GROVE PLACE," MANCHESTER.

On the 1st August, 1920 we took possession of 'Grove Place Pen' (3,362 acres) in Manchester, which had been prechased from Dr. Halliday for £10,000.

The Live Stock was sold by auction on the pen. It was considered desirable to purchase a foundation of breeding cows and heifers from the original herd and 125 head were secured besides a few brood mares and six working mules. Additional heifers for foundation stock were purchased from the herds of the Honourable C. W. Hewitt of Copse, in Hanover, from Adam Roxburgh, Esq., and F. Roper, Esq., of St. Ann. Twenty-four head of cattle were transferred from the Hope herd. In addition 15 heifers sired by the English Red Poll bull "Sudbourne Avocado" and a number of half-bred Holstein heifers were purchased from Carton Pen in St. Ann. A breeding herd of a little over 200 cows was thus established. All these are being bred to selected dairy bulls and the first cross heifers will be utilised as the nucleus of a working dairy herd to start operations in 1925 when the pen is expected to become self-supporting on a dairy basis.

The chief inducement for the purchase of 'Grove Place' was its central position and the fact that the Railway passes right through the property. This site was therefore an ideal one for the Government Stud Farm and this has now been established there and at the time of writing has already proved itself a great success and to have met a long-felt want in the country. Provision having been made on the estimates for the importation of a select Stud of Beef Cattle, arrangements were made to secure them in England through the generous services of prominent breeders with expert knowledge of the cattle.

I desire to record our great indebtedness to the services of the following gentlemen in England who assisted in this enterprise by their personal skill in selecting the cattle:—

- J. R. Hill, Esq., Orleton Manor, Hereford (Herefords)
- J. J. Crindlan Esq., Maisemore Park, Gloucester, (Aberdeen-Angus),
- Gordon C. Skinner, Esq., Somerset, (Devons)
- H. B. Amos, Esq., Kent, (Sussex)

The animals sent to Jamaica are set out in the list below.

All arrived in good order and this importation must be regarded as having been highly successful.

The work of organising "Grove Place" will take some years. In 1920 we were only able to construct the dipping tank and to renew the flight of barbecues so as to secure a reliable catchment for the water supply.

Mr. C. F. Thomson was retained as the Manager of the Farm and by his knowledge and experience has proved of great aservice in organising the new Stud Farm.

Aberdeen-Angus—

16. Bull "Popinjay of Buckland" 46,623. Cost £242, Sire: 'Proud George' 38,595, (Champion Bull), Dam: Elisma 46,600, bred by Capt. C. T. Scott, Buckland Manor, Worcester.
17. Cow "Bridesmaid's Return" 61,104. Cost £146, Sire: Prince of Buckland 35,075, Dam: Brides Return 47,960, bred by Capt., C.T. Scott, Buckland Manor, Worcester.
18. Cow "Buckland Missy II" 63,393. Cost £146, Sire: Prince of Buckland 35,075, Dam: Proud Black Missy 45,817, bred by Capt. C. T. Scott, Buckland Manor, Worcester.

19. Cow "Elisma II of Buckland" 63,396. Cost £146, Sire: Adonis of Buckland 35,418, Dam: Elisma 46,600, bred by Capt. C. T. Scott, Buckland Manor, Worcester.

Hereford—

12. Bull "Peacemaker" 35397. Cost £259, Sire: Shraeden Wizard 28,718, Dam: Phyllis, v. 44, p. 896. Bred by John Walker, Worcester. Prize Winner Royal Agricultural Society of England
13. Cow "Particia" v. 50, p. 604. Cost £151, Sire: Newton Monster 34,060. Dam: Peeress v. 47, p. 640, bred by J. R. Hill, Orleton Manor, Herefordshire.
14. Cow "Holly" v. 50 p. 604. Cost £151, Sire: Great Push 33,718, Dam: Mistletoe v. 47, p. 643, bred by J. R. Hill, Orleton Manor, Herefordshire.
15. Cow "Ivington Bella" v. 50, p. 628. Cost £151, Sire: Ivington Sailor 29,353, Dam Hyde Bell v. 43, p. 803.

Brown Swiss—

1. "Loretta T", 6,510. Cost £163, Sire: 'Premier of Walhalla' 3,199, Dam: Bertha T, 5,422," bred by C. F. Thomas, Conn., U.S.A.
2. Cow "June 7,117". Cost £139, Sire: Emerson 3,802", Dam: Eloise C. 2,418", bred by D. H. Cook, Albany, New York.
3. Cow "Diana of Walhalla" 8,336, Sire: Octavius 4,139', Dam: Dianthia 5,319. Cost £133 bred by F. Freemyer, New York.
4. Cow "Ola B 2nd 6,950". Cost £139, Sire Tom Phylis 1,769, Dam: 'Ola B 4,348, bred by F. Freemyer, Walhalla Farms, New York.
5. Cow "Siglinda 8,596". Cost £127, Sire: Elijah 4,393, Dam: Sweet Marie 2,835, bred by F. Freemyer, Walhalla Farms, New York.
6. "Edna of Walhalla 9,077". Cost £127, Sire: Octavius 4,139, Dam "Edna 2nd 4,598", bred by F. Freemyer, Walhalla Farms, New York.

Sussex—

7. Bull "The Arab" 4,365, Sire: Lock Arab 2,819, Dam: Apsley Glitter 11,265. Cost £172, bred by Major G. H. Loder, Crawley, Sussex.

Devon—

8. Bull Northmoor Rentpayer 9,873, Sire: Gotton Prince 2nd 8,070, Dam: 'Northmoor Rachel 28,840.' Cost £152, bred by Sir G. A. H. Wills, Somerset.
9. Cow "Dorothy II" 29,590. Cost £126, Sire: 'Pound Delegate 3rd' 8,210, Dam: Dorothy 27,113, bred by Fred. Stanbury, Cornwall.
10. Cow "Joan III" 29,591. Cost £126. Sire: Pound Delegate 3rd 8,210, Dam: Joan 24,697, bred by Fred. Stanbury, Cornwall.
11. Cow "Aylesbeare Nurse" 31,177. Cost £126, Sire: Blanche Touffe 7,941, Dam: Pound Nun 24,641, bred by Alfred T. Loram, Exeter.

VII.—DEPUTY ISLAND CHEMIST.

Government Laboratory, Hope,
Kingston P.O., June 28th, 1921.

Sir,

I have the honour to submit the following report on the work done at the Government Laboratory during the nine months April to December, 1920.

The total number of samples dealt with during the nine months was 926 as compared with 1,380 and 1,246 in the two previous official years.

These may be classified as follows:—

(1) <i>Police—</i>				Samples taken under the Adulteration of Food and Drugs Law 25 of 1908.			
					Genuine.	Adul- terated.	Total.
Human Viscera and Organs	2						
Vomits and Stomach contents	6						
Stains on Clothing	1						
Substances examined for poison	15						
Medicines	1						
Counterfeit Coins	34			Fresh milk	3	21	24
Genuine Coins	6			Butter	2	1	3
Coining Accessories	12			Margarine	2	—	2
				Whisky	—	1	1
<i>Under the Petroleum Laws.</i>				Gin	2	1	3
Kerosene Oils	3			Port Wine	2	4	6
				Essences	2	2	4
<i>Under the Spirit License Laws.</i>							
Rums	2			Total	13	30	43
Total	82			Total Police	..	..	125

(ii) <i>Customs—</i>			B. AGRICULTURAL.		
Native Wines	..	76	Soils & subsoils	..	18
Porter	..	6	Fertilizers	..	1
Rect. Spirits & Absolute Alcohols	..	23	Agricultural Limes	..	6
Lime Juices	..	2	Canes	..	4
Denatured Alcohols	..	1	Cane Juices	..	6
Essences & Extracts	..	4	Fodders	..	1
Turpentine	..	6	Vegetable Oils (fixed)	..	1
Condensed & Dried Milks	..	2	Cattle Dips	..	35
Lubricating & Fuel Oils	..	2	Miscellaneous	..	6
Dyestuffs	..	4			
Specially examined—			Total	..	78
Brandy	..	1			
			C. GENERAL.		
Total	..	127	Stock Farm Milks	..	418
			Waters, Potable	..	11
(iii) <i>Island Medical Department—</i>			Waters, Boiler	..	1
Condensed Milks	..	3	Waters, Irrigation	..	4
			Foods (Private)	..	14
(iv) <i>Public Works Department—</i>			Sugars	..	60
Clays and Limestones	..	14	Rums	..	37
Oils	..	1	Wines	..	2
Waters	..	3	Condensed Milks	..	3
(v) <i>Government Railways—</i>			Minerals	..	4
Coals	..	4	Miscellaneous	..	9
Boiler Waters	..	8			
			Total	..	563
Total Official	..	285	Grand Total	..	926

OFFICIAL SAMPLES.

The 8 analyses of human organs, vomits and stomach contents, were made in connection with 4 deaths. In one case poison was found and recovered from the viscera.

1. $\frac{3}{4}$ grain Hydrocyanic Acid from the stomach of a Druggist who committed suicide.

In the samples suspected of containing poison were:

1. 46 grains Copper Sulphate in a water melon.
2. 7 grains Powdered Glass in a dish of Soup.
3. 25 grains Copper Sulphate in cooked rice.
4. 7 grains Copper Sulphate in food.
5. 10 grains Powdered Glass in food.

Finely powdered Borax sold as Epsom Salts by a Chinese shopkeeper in St. Andrew caused severe illness in three members of a family, and once more emphasizes the dangers to which the public is exposed when purchasing medicinal substances from other than Licensed Druggists.

The 34 Counterfeit coins examined were made entirely of Tin, and revealed the fact that Spanish Town was the chief centre of manufacture, the entire stock of Strip Tin in a local ironmonger's shop having been purchased by two counterfeiters who were convicted and sentenced to 2 years.

Six samples of porter seized by the Collector of Customs at Chapelton revealed that a fairly large brewing trade was being carried on in the parish, and resulted in the conviction of several Chinese for a breach of the Brewer's License Law. The samples contained an average of 15 per cent. Proof Spirit.

Samples of so-called Whisky, Brandy, Port Wine, manufactured locally were examined and analysed and found to consist either wholly or in part, of rum and flavouring matters. It is to be regretted that up to the present time the legality of the manufacture and sale of these articles has not been questioned in the Courts by the proper authorities.

The number of samples taken under the Food and Drugs Law continues to remain less than in former years. That the need exists for the display of greater energy by the authorities charged with taking samples under the Law, is shown by the fact that over 70 per cent. of the samples examined during the period proved to be adulterated. In the case of 14 milk samples submitted from St. James, all were found to be adulterated with water, the amounts of added water ranging from three to forty-nine per cent.

The number of samples from the Customs and other Government Departments continues to increase annually and at present takes up fully three-quarters of the time of the staff.

AGRICULTURAL.

Experiments carried out with Red Extract of Squill imported from the United Kingdom, proved that the Jamaica rat can withstand not only prolonged feeding with the Extract in various dilutions, but comparatively large doses of the undiluted Extract.

Subsequent experiments carried out using extracts (alcoholic and watery) made from Squill bulbs and mixed with baits in various proportions were found equally ineffective. Squill bulbs finely cut up and mixed with bait at the rate of 25% of Squill in the mixture also proved ineffective.

The testing of the cattle dips and the preparation of Trypan Blue, was carried out during the year on behalf of the Stock Farm and various Penkeepers.

GENERAL.

The quarterly Chemical Examination of the Kingston Water supply were carried out, and demonstrated the maintenance of good organic purity throughout the period.

Further samples of clays and limes tones were examined as to their suitability as raw material for the manufacture of cement locally.

The systematic analysis of the milk produced by individual cows, and the mixed milk of the stock at the Government Stock Farm was made during the period. The quality of the milk continues to be superior to that vended locally.

A number of rums were examined for local merchants who apparently are again buying and selling rums with a definite ether content.

The distribution of various commodities supplied the public continued during the period, and the greatly increased call for paranaph and Arsenited of soda for cattle dipping was successfully met.

The following table shows the amounts distributed in comparison with the two previous years. This work has now developed to such proportions as to call for almost the entire time of an Assistant

	1918-19.	1919-20.	Apr. 1920-Dec. 1920.
Paranaph ..	4,554 lbs.	10,052 lbs.	10,679 lbs.
Arsenite of Soda ..	1,323 "	4,368 "	5,659 "
Copper Sulphate ..	1,667 "	1,804 "	482 "
Carbon Bisulphide ..	1,938 "	1,266 "	470 "
Rat Poison ..	994 "	334 "	295 "
Thymol Powders ..	132 ozs.	171 ozs.	52 ozs.
Std. Iodine Solution ..	..	8,000 c.c.	19,000 c.c.

I have the honour to be,

Sir,

Your obedient servant,

E. N. RICHARDS,
Acting Deputy Island Chemist.

VIII.—MICROBIOLOGIST.

REPORT OF THE MICROBIOLOGIST, 1920.

The number of samples collected or forwarded for examination this year has been 67 apportioned among cultivated crops in the undermentioned way:

Canes ..	..	..	17
Bananas ..	..	..	10
Coconuts ..	..	..	12
Miscellaneous ..	..	..	28
Total ..	..	..	67

The materials have come to hand through the undermentioned channels:—

Planters ..	..	..	15
Agricultural Society ..	..	..	12
Inspectors of Plant Disease ..	..	..	18
Collected by Microbiologist ..	..	..	22

Bananas.—Panama Disease or Banana Wilt.—This disease has continued to give evidence of being under reasonable control. A number of affected plants were found on small cultivations within a restricted area in a parish where disease had not occurred hitherto. The main area in bananas in that parish is still free from disease. In Portland in spite of considerable planting recurrences have been confined mainly to localities where cases had shown up in preceding years. In St. Mary the situation continues to be favourable. The inspector for that parish has found the disease practically confined to a few restricted spots on some of the larger cultivations, but its effects on production has been inappreciable. A few new spots have been discovered in St. Ann.

The position of some new spots pointed to probable infection through trash collected at fruit receiving depots. Most large planters are now alive to the danger and destroy the trash used for bedding fruit. Posters warning the cultivators against the removal of such trash from fruit depots have been issued.

Coconuts.—A few cases of budrot have been observed. The drought of last year has greatly restricted the incidence of that disease. The Leafbite diseases, for several years conspicuous in the north eastern parishes during and after the hurricane years 1915-17, have ceased to be epidemic and many trees have thrown off the attack naturally. Dieback has increased in its incidence again. This disease had been much in evidence during the dry years preceding 1912 and had fallen off since then. Its recent increase appears to be related to the droughts of 1919-20.

A recent examination of the root system of affected trees showed a considerable number of dead and partially diseased roots. From the latter a species of *Rhizoctonia* and a species of *Pythium* were collected. It is probable that these fungi play an important part in bringing about root deterioration. In Hawaii a species of *Pythium* has been isolated from the roots of cane, banana, taro, pineapple and rice, and it was found to cause the decay of cane roots in sterilised soil inoculated with it. Both *Rhizoctonia* and *Pythium* have been recently found associated with Root Disease of cane in Porto Rico. The treatment of coconut trees affected by Dieback should aim at the vigorous regeneration of the roots in trees young enough to react effectively to help. Forking, removal of immature nuts in all stages of development and application of bluestone to the soil around the trunks may prove to be useful measures for restoring such affected trees.

Cane.—The *Mosaic, Mottling or Yellow Stripe Disease* has received much attention since its presence in Jamaica was recognised early last year. It is rather widely distributed but the incidence is light except on a few cultivations. A serious reduction of tonnage due to this disease has been found in all the cultivated varieties. Transparent endures the disease better than the ribbon varieties. Some seedlings such as B208 and B3922 are severely affected. Uba (Kavangire) appears to be immune against mosaic in Jamaica. Seed-piece selection and especially roguing out of affected plants from the young cane has been adopted by many planters and there is good evidence that these measures will succeed if persevered with. A limited area in an immune or highly resistant variety should however be established and maintained on all large cultivations.

Research.—The Microbiologist was absent from the island on leave during five months of the year and was engaged during part of that time in research work at the Pathological Laboratory, Royal Botanic Gardens, Kew, on Panama Disease of Bananas and Budrot of Coconuts. A report on this work has been submitted.

Fermentation.—Pure cultures of yeast have been furnished to a number of distilleries. The continued demand for these cultures indicates that they have proved of value in starting a good fermentation at the outset of the crop whenever the directions for working up the yeast have been carefully followed out.

S. F. ASHBY,
Microbiologist.

IX.—GOVERNMENT ENTOMOLOGIST.

Government Laboratory, Hope, Kingston P.O.,
April 2nd, 1921.

Sir,

I have the honour to submit my Annual Report for the year ending December 31st 1920.

2. I sailed from England on July 13th, 1920, and arrived in the island on July 26th to take up the duties of Government Entomologist. So that it may be realised what is necessary to be done and to be obtained, it will not be out of place here to state that as no records and practically no equipment and insect collections—with the exception of a few damaged unnamed insects without data—were found by me on my arrival it has been necessary for me to start the work from the very beginning just as if the post of Government Entomologist were a new one.

3. In order to become acquainted with the agriculturists and with local agricultural conditions, several tours were made in company with the Inspectors of Plant Diseases and to visit certain estates whenever my assistance was definitely needed. In this way I spent thirty days away from headquarters. In addition to this I left the island on Dec. 10th to attend the Public Hearing on Dec. 20th at Washington before the Federal Horticultural Board on the question of restricting or prohibiting the importation of raw fruits and vegetables from Jamaica and returned on Jan. 2nd. The result of the Hearing was the subject of a special report to you on Dec. 20th.

4. Brief notes of the insect pests of the period under review are given below under the headings of the crops which they attack.

Sugar Cane. 1. Moth Borer, *Diatraea saccharalis*, F. This insect appears to be generally distributed throughout the island. The measures of control which should be systematically applied are (i) the collection of the eggs, (2) the planting of only sound canes, which should be treated with Bordeaux mixture, (3) the destruction of canes that are worthless for milling. Some very bad cases of this borer in the Uba cane were shown to me.

2. White Grubs. These are the larvae of the 'hard-backs,' *Lachnosterna* spp. A few complaints were received of damage caused by these insects. The larvae of the click-beetle, *Pyrophorus plagiopthalmus*, Germ., the beetle of which is well known locally on account of its two luminous thoracic spots, feeds on the white grubs.

3. Cane Fly, *Stenocranus saccharivorus*, Westw. This insect does not rank at present as serious a pest as the above; but as the eggs are deposited within the tissues of the leaves and the insect is very agile, the question of its control without resorting to spraying measures gives little hope of success.

4. Shot Hole Borer, *Xyleborus perforans*, Woll. Two cases of this insect have come to my notice. It is considered that the chief damage to canes by this beetle is to permit of the easy entrance of the spores of fungi, and that it is doubtful whether this insect does attack healthy plants.

5. 'White Ants,' *Eutermes ripperti*, Ramb. Several cases have been reported of this insect attacking canes, but the cases which I have had the opportunity of seeing, the canes were planted amongst coconut and there were nests on the growing coconut trees and in the decaying stumps so that the result could hardly have been unexpected.

Corn.—1. Fall Army Worm, *Laphygma frugiperda*, S. & A. There were several outbreaks of this caterpillar and it was necessary to adopt remedial measures, such as spraying with arsenate of lead or applying a poison bait. A light shallow cultivation during the pupal period was also found advantageous. The insect has several natural enemies, some of which are of great assistance and among which are the ground beetle, *Calosoma laterale*, F., the Tachinid flies, *Frontina aletiae*, Riley, and *Archytas piliventris*, v. d. W., the Ichneumon, *Henicospilus purgatus*, Say, and three species of the small wasps of the family Chalcidae, *Chalcis robusta*, Cress., *Chalcis* sp., and *Spilochalcis femorata*, F. The life-history and habits of this insect have been worked out and a pamphlet will be submitted for publication later.

2. Earworm, *Heliothus obsoleta*, F. There appears to be four broods locally. The eggs of the first brood are laid on whatever food plants are available, such as corn, peas, beans, and the caterpillars attack the corn as soon as it is about knee-high, feeding in the axils of the tender leaves and when they are in such a position powdered arsenate of lead should be applied.

3. Corn Hopper, *Peregrinus maidis*, Ashm. This insect is seen wherever corn is grown, but during the period under review it did not occur in sufficient numbers to demand action.

4. Cricket, *Gryllus assimilis*, F. This cricket occurs in small numbers.

5. Chrysomelid Beetle, *Ceratoma ruficornis*, Oliv. In one instance this beetle occurred in large numbers so that it was necessary to apply a stomach poison.

6. Green Fly, *Aphis maidis*, Fitch. Occurs throughout the corn growing sections and its 'lady-beetle' predator, *Neda sanguinea*, (L.), is always much in evidence.

Sisal.—1. Scale Insect, *Pseudischnaspis bowreyi*, (Ckll.). During the recent prolonged drought this scale insect was found to occur in nearly all the areas of sisal examined, as well as on Kerratto (*Agave morrisii*), but soon after the advent of the rains in most cases merely the depressions of the scale were seen. Whether the change of climatic conditions were responsible for this condition I cannot definitely state, but without doubt the predators, the Tenebrionid beetle, *Epitragus jamaicensis*, Champ. and the 'lady-beetle,' *Neda* sp., did very useful work.

1. Weevil, *Sycphophorus acupunctatus*, Gvl. Specimens of the grubs and adults were found in the 'bull-end' of a polled sisal. This insect is indigenous to Mexico and Central America, and is now known to occur in Curacao, Cuba, Haiti, East Africa and Java. There is no previous record of this weevil occurring in Jamaica.

Cacao.—1. Thrips, *Solenothrips rubrocincta*, (Giard.). Though serious attacks of this thrips apparently occur when conditions of soil and climate are unfavourable, this insect cannot be disregarded, for it does its damage quickly and under conditions favourable to itself multiplies with rapidity. Under such conditions it will be found necessary to apply some spray such as whale oil soap or "Black Leaf 40," and at the same time attention should be paid to correcting the conditions favourable to the increase of the insect by attending to such matters as the application of humus and manure and to drainage.

2. Scale Insect, *Asterolecanium pustulans*, (Ckll.). One case was submitted of this insect attacking this crop, the branches being badly attacked.

3. Borer, *Apate terbrans*, Pall. One case of this beetle boring into a cacao branch has been submitted to me.

Coffee.—1. Scale Insects. The most prevalent scale insects on coffee in this country are *Saissetia hemisphaerica*, (Targ.), *S. nigra*, (Nietn.), and *Ischnaspis longirostris*, (Sign.), all of which include a large number of other plants among their food plants.

2. White Leaf Miner, *Cemiosoma coffeella*, Staint. I can find no previous record of this insect occurring in Jamaica. The female makes a slit in the leaf and deposits an egg. In from four to six days the young larva emerges and feeds on the mesophyll of the leaf for about three weeks, during which time it destroys the mesophyll causing black irregular patches. The larva weaves a delicate web in the shape of an H on the underside of the leaf and transforms to the pupa beneath it. The pupal stage occupies from four to six days. The length of the life of the moth is from one to two days, the eggs being deposited during the first day.

Banana.—1. Banana Borer, *Cosmopolites sordida*, Chev. I have had the opportunity of visiting several banana plantations in which this borer occurs and also to visit some places where it was first discovered. Though it is an insect whose presence in a banana plantation should by no means be ignored, it need not, in my opinion, be the cause of undue alarm, since with care it can be kept under control to such an extent that the plants remain productive. My experience with this insect leads me to the conclusion that for it to become a serious pest some of the following factors must be present:—

- (a) Unsuitable soil.
- (b) Lack of cultivation.
- (c) Growing of bananas on the same land over a long period.
- (d) Unsanitary measures, such as neglect to remove or destroy old bulbs.
- (e) Excessive mulching.

And, therefore, that the control of the pest will depend, in the absence of natural checks, on careful regard to:—

- (a) Cultivation.
- (b) Rotation.
- (c) Systematic trapping.

Citrus.—1. Black Fly, *Aleurocanthus woglumi*, Ashby. An inspection was made of the *Citrus* growing sections of the country with the view of ascertaining dissemination of this pest since a similar inspection made about a year and a half ago by the Microbiologist and with the view also of ascertaining the relationship between this pest and certain ants. It was found that the insect had spread somewhat in spite of unfavourable climatic conditions. A pamphlet is now in the press dealing with this insect and embodies what is now known of its life-history and habits, methods of control and its relationship to the ant, *Cremastogaster brevispinosa*, Mayr., var *minutior*, For., and other sub-species and varieties.

2. Scale Insects. The scale insects which are the most prevalent on *Citrus* are *Chionaspis citri*, (Comst.), *Lepidosaphes beckii*, (Nem.), *Saissetia hemisphaerica*, (Targ.), *Chrysomphalus aonidum*, (L.), *Pseudocnidia articulatus*, (Moeg.), *Ischnaspis longirostris*, (Sign.). In fact, I consider scale insects more serious pests of the *Citrus* industry than the above. Though, at the same time it must be pointed out that with few exceptions *Citrus* is grown under such unfavourable, neglectful conditions that it is to me a marvel that the trees have stood up so well against such adverse conditions.

3. Orange Dog Caterpillar, *Papilio cresophontes*, Cram. Specimens of the caterpillar of this striking butterfly were submitted by one orange grower.

Tobacco.—No complaints of insect attack were received during the period under review.

Coconuts.—1. Rhinoceros beetle, *Strategus titanus*, F. No complaints were received of attacks by this beetle.

2. Scale Insects. The principal scale insects observed on this tree were *Vinsonia stellifera*, Westw., *Pseudoparlatoria ostreata*, Ckll., *Pinnaspis buxi*, Bouché, and *Diaspis boisduvalii*, Sign.

3. White Fly, *Aleurodicus cocois*, (Curt.). Specimens of this insect were taken off a coconut tree, but they do not often occur in sufficient numbers to be classed as a pest.

4. Shot Hole Borer, *Xyleborus* sp. A few cases of this borer were reported.

Pineapple.—1. Weevil, *Metamasius ritchiei*, Mshl. With the view of obtaining material to work out its life-history a search was made for this weevil in certain localities, but though several plants were found having old tunnels very few grubs or adults have been found up to the present.

2. Scale Insect, *Pseudococcus brevipes*, (Ckll.). This scale is found wherever pineapples are grown. Attention should be paid to the planting of clean plants and to the destruction of the ants accompanying the scale insect.

Grape.—1. Green Fly, *Aphis illinoisensis*, Schimer. Some damage is caused to the young foliage by this Aphid.

2. Scale Insect, *Aspidiotus cydoniae*, Comst. One case of this insect attacking grape has been observed.

3. Borers, *Apate terebrans*, Pall., and *Dinoderus* sp. A few cases of these borers tunnelling in the older wood of grape were submitted and observed.

Mango.—1. Thrips, *Solenothrips rubrocinctus*, (Giard.). A few cases of this insect were observed in Manchester.

2. Fruit Fly, *Anastrepha fraterculus*, Wied. Adults were reared from mangoes collected in several parts of the island. This fly also attacks two kinds of plums, almond and guava.

Breadfruit.—1. Scale Insect, *Asterolecanium pustulans*, (Ckll.).

Pimento.—1. Scale Insect, *Odonaspis pimentae*, Newst. This scale insect occurs on pimento throughout the country, but apparently does no damage.

2. Borer, *Cylindera flava*, F. (*Cryptomeris pilicornis* F.) Two specimens of this beetle were found tunnelling in pimento.

FOOD CROPS.

Yam.—1. Scale Insect, *Aspidiotus hartii*, (Ckll.). This is a common scale insect on yam tubers throughout the Island.

2. Beetle, *Palaeopus dioscorae*, Pierce. This insect was reared from stems of yellow yams received from St. Catherine. It was described in 1918 from specimens submitted by Mr. Ashby.

Sweet Potato.—1. Weevil, *Cylas formicarius elegantulus*, Sum. This weevil is very prevalent in certain parts of the island, while other parts are remarkably free.

2. Beetles, *Ceratoma ruficornis*, Oliv., and *Coptocycla flavolineata*, Latr. These two species caused quite a little damage in one locality to this crop.

Cabbage.—1. Green Fly, *Rhopalosiphium persicae*, (Ulz.).

Egg Plant.—1. Scale Insects, *Saissetia hemisphaerica*, (Targ.), *Aspidiotus cydoniae*, Comst., and *Hemichionaspis minor*, (Mask.).

Cassava.—1. Bud Maggot, *Lonchaea chalybea*, Wied. In one locality the bud maggot destroyed the growing points of this crop.

2. Caterpillar, *Erinnyis ello*, Mer. This caterpillar caused a set-back to this crop in one district by defoliating it. The caterpillars are preyed on by the bug, *Alcaeorhynchus grandis*, Dall.

Congo (Gungo) Peas.—Several complaints were received of the attacks of the scale insects, *Hemichionaspis minor*, (Mask.), *Saissetia hemisphaerica*, (Targ.), and *S. oleae*, (Bern.), and of the beetle *Macraspis tetradactyla*.

Miscellaneous.—*Stored Flour*.—One complaint was received of the Mediterranean Flour Moth, *Ephestia kuehniella*, Zeller, attacking stored flour.

Goats.—Specimens of the louse, *Linognathus stenopsis*, (Burn.), taken off goats were received from one correspondent.

I have the honour to be,

Sir,

Your obedient servant,

C. C. GOWDEY, B.Sc., F.E.S., F.Z.S.
Government Entomologist.

X.—AGRICULTURAL LEGISLATION IN 1920.

LAWS RELATING TO AGRICULTURE, PASSED DURING THE YEAR, 1920.

Law No.	Date assented to.	Short Title.	Chief Provisions.
14	14th May, 1920	The Praedial Larceny Amendment Law, 1920	(1) Making it lawful for an Authorised Person to call upon any person to assist him in the execution of his duty.
20	26th June, 1920	Importation of Bees Law, 1920.	(2) Empowering Authorised Persons to require suspected persons to disclose the contents of any basket, bundle, etc. (1) Prohibiting the importation of Bees, honey and beekeepers stocks, save with the permission of the Director of Agriculture. [(2) Repealing Law 19 of 1920.]
22	26th June, 1920	Sugar Convention (Repeal) Law, 1920.	Repealing Law 10 of 1904.
23	26th June, 1920	Importation of Animals Law, 1920	Making it unlawful to import any animal without the written permission of the Governor. This Law does not apply to cattle, horsekind, dogs, sheep, goats or swine.
24	26th June, 1920	Bees (Transportation) Law, 1920	Governor may make rules regulating the transportation of Bees along any main road or parochial road.
26	26th June, 1920	Agricultural Loan Societies Amendment Law 1920	Interest on Loans fixed at 4 per cent. per cent. per annum.
35	23rd July, 1920	The Birds and Fish Protection Amendment Law, 1920	Making it lawful for the Governor in Privy Council to prohibit the use of nets, pots, etc., for catching fish in any harbour, river, etc., or to prohibit fishing altogether in any such place.
41	31st Aug. 1920	The Tick (Control and Eradication) Law, 1920.	Governor in Privy Council may make Orders to secure periodical dipping or other treatment of cattle for control and eradication of Ticks, and may also direct owners or occupiers of the holdings to construct dipping tanks. Provision is also made for the construction of Public Dipping Tanks.
47	15th Nov., 1920	The Notice to Quit (Extending Time) Law, 1920	A tenant having growing crops and receiving notice to quit of less than twelve months may give notice to the Landlord that he intends to remain on the land for a period not exceeding twelve months and not less than one month from the expiry of the notice to quit.
49	22nd Nov., 1920	The Public Lands Acquisition Law, 1920.	The acquisition of land for the purpose of selling such in lots of not less than 5 and not more than 50 acres as Agricultural holdings to be deemed a Public Work within the meaning of Law 31 of 1897.
52	29th Nov. 1920	The St. Thomas Central Factory (Contracts) Law 1920.	A Contract under the Law creates an incumbrance on the land.

ORDERS, RULES, ETC., RELATING TO AGRICULTURE MADE DURING THE YEAR 1920.

Date	Description.	Subject.
1920— 19th May	Declaration	Mosaic Disease of Sugar Cane an infectious Disease within the meaning of Law 3 of 1915.
but they rept. 4. Shot	Order Rules	The Mosaic Disease of Sugar Cane Order, 1920. Regulating the Transportation of Bees along Main and Parochial Roads.
15th	Order	Prohibition against the importation of Cotton not to apply to Cotton imported from the Turks and Caicos Islands.

XI.—STAFF

During the year the Department suffered severe losses in its staff.

In October Mr. W. Harris, F.L.S., Assistant Director of Agriculture and Government Botanist, died while on leave in the United States. This was the first occasion on which Mr. Harris had taken leave during a period of 39 years' service. His services to Botanical Science are represented by the addition of 40 per cent. to the number of the recorded species of plants in the island as a result of his personal discoveries. As Assistant Director of Agriculture Mr. Harris was of great assistance to the Department and we all feel his loss very greatly.

Mr. R. Simmons, F.I.C., Deputy Island Chemist went on leave in May and was promoted toward the end of the year in another Colony.

Mr. S. F. Ashby, B.Sc., Microbiologist, left shortly after the end of the year to take up the appointment of Mycologist to the Imperial Department of Agriculture for the West Indies.

Thus, almost at one blow, the Department was deprived of three of its technical scientific officers and, to date, there appears to be no immediate prospect of their being replaced by new officers.

Mr. C. C. Gowdey, B.Sc., F.E.S., F.Z.S., formerly Entomologist for Uganda, was appointed Government Entomologist in July and has made strenuous efforts to organise his work and laboratory which he found to be in bad condition.

Mr. E. E. A. Campbell, M.Sc., was appointed Industrial Chemist in May and has concentrated his attention on the researches in connection with Pimento Oil and Vanillin.

Mr. E. N. Richards has acted as Deputy Island Chemist since May 28.

Since August the duties of Assistant Director and Government Botanist have been divided between Mr. G. D. Goode, as Acting Assistant Director, and Mr. M. S. Goodman as Actg. Superintendent of Public Gardens, both officers in addition performing the duties of their substantive posts.

Mr. E. Downes, of Kew, was appointed Assistant Superintendent of Public Gardens in November.

Mr. C. F. Thomson was appointed Superintendent of the Government Stock Farm at Grove Place in July.

Mr. E. U. Lewis was appointed Stock Manager of Grove Place in July.

Mr. J. W. Caseley was appointed Farm Foreman at the Hope Stock Farm in July.

Mr. S. A. Rose was appointed Foreman of the Government Stock Farm, Hope, in December.

I desire to acknowledge the loyal and effective assistance rendered by the staff during a year of considerable difficulties.

I have the honour to be,

Sir,
Your obedient Servant,

H. H. COUSINS,
Director of Agriculture.

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